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Psychometric Validation of the German Version of the Rapid Assessment of Physical Activity (RAPA): A Secondary Analysis of Cross-Sectional Survey Data

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Received: 9 September 2024 | **Revised:** 17 December 2024 | **Accepted:** 2 January 2025

Funding: The authors received no specific funding for this work.

Keywords: cardiovascular disease | geriatrics | health promotion | physical activity | public health | self-report

ABSTRACT

Background and Aims: Regular physical activity holds numerous health benefits for older people, yet the majority of older people do not meet the World Health Organization's physical activity recommendations. Brief physical activity screening tools can support healthcare professionals in identifying patients who would benefit from physical activity promotion and counselling. The Rapid Assessment of Physical Activity (RAPA) questionnaire is a validated brief physical activity screening tool designed for clinical practice.

Methods: We conducted a psychometric validation of a new German translation of the RAPA by performing a secondary analysis of survey data from 234 former cardiac rehabilitation patients (mean [SD] age 69 ± 11 years, 23% female) in Austria. For psychometric validation, we used the following survey measures: the new German version of the RAPA, two customized questions about physical activity behavior, one customized question about perceived health self-management, and the German version of the EuroQol health-related quality of life questionnaire. We performed Spearman's correlations to assess the relationship between the German RAPA and the other measures (i.e., physical activity behavior, self-management of health and health-related quality of life).

Results: Aerobic physical activity level according to the RAPA correlated significantly with weekly frequency (Spearman's $\rho = 0.31$, 95% CI [0.18, 0.43], $p < .001$) and volume of PA ($\rho = 0.34$, 95% CI [0.21, 0.45], $p < .001$), as well as perceived health self-management and five out of six dimensions of the EuroQol questionnaire.

Conclusion: Our data demonstrate convergent validity and contribute to the psychometric validation of the new German version of the RAPA. These initial findings lend themselves to future dedicated psychometric validation studies of the German RAPA (against gold-standard physical activity questionnaires or direct physical activity measures) to further explore the potential of this tool for use in German-speaking geriatrics healthcare.

1 | Introduction

Physical activity (PA) is related to improved healthy ageing, in terms of health and functioning level [1]. Despite this, physical

inactivity is a major concern in Austria, and many European countries worldwide. In Austria, 76% of the adult population does not fulfill the World Health Organization (WHO) PA recommendations [2], with the growing segment of older adults

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Summary

- This study contributes to the psychometric validation of the new German version of the Rapid Assessment of Physical Activity (RAPA) questionnaire.
- Findings show that the German version of the RAPA correlates significantly to self-reported weekly frequency and volume of physical activity, perceived health self-management, and health-related quality of life, thus supporting the convergent validity of the tool.

showing greater inactivity [3]. Hence, there is a need to regularly assess and promote PA in healthcare settings, especially among older-aged patients. To do so, the use of easy-to-administer and affordable PA measures may be of particular aide.

The Rapid Assessment of Physical Activity (RAPA) is a previously validated, brief, self-reported measure of PA for use in clinical practice among older adults (> 50 years old) [4]. It is a brief screening tool to identify physically inactive patients, for whom PA counseling can then be initiated. In 2018, the RAPA was rated best for measuring PA in healthcare settings against 13 other short-report PA tools in terms of validity, reliability, feasibility, and inclusion of aerobic and muscle strengthening assessment [5]. For cardiovascular disease prevention, this may be particularly useful given the burden of physical inactivity on cardiovascular health and the opportunity for a quick self-report questionnaire to initiate brief PA counseling and support directly in the healthcare setting [5]. Moreover, the RAPA has been shown to be reliable across people speaking various languages (e.g., Hungarian, Turkish, Mexican Spanish, Gujarati, and Arabic) [6–10].

Initial steps to adopt the RAPA to the Austrian healthcare context were taken to develop a German version of the RAPA for Austria, using forward and backward translation and qualitative validation [11]. The aim of this paper is to build upon these steps and contribute to the psychometric validation of this new version of the RAPA. To do so, we opportunistically used data from a previous study [12, 13] to validate the RAPA in a cardiac population. Given the RAPA's intended use in clinical settings, we believe this is a relevant population for a preliminary psychometric validation, however, warranting future follow-up analyses in the general population.

2 | Methods

2.1 | Study Design

We performed a secondary analysis of data from a cross-sectional postal survey, which explored habitual PA behaviors among former cardiac rehabilitation (CR) patients in Austria. The survey design has been described in detail elsewhere [12, 13]. The survey instruments are available online (Open Science Framework, <https://osf.io/hcvfm/>).

In brief, from May 2022 to January 2023, a total of 1000 questionnaires were distributed to former patients of five participating CR centers in the Austrian federal states of Carinthia, Vorarlberg, Upper Austria, and Lower Austria. Participant selection was

based on patients' previous completion of CR at the participating centers since January 2019. Additionally, participants had to be over 18 years old, residing in Austria, and proficient in German. In total, 234 patients returned completed questionnaires (23.4% response rate). The questionnaires included the new German version of the RAPA [11] and the following items, which we subsequently used for psychometric validation of the new RAPA version: the German version of the EuroQol health-related quality of life questionnaire (EQ-5D-5L/EQ-VAS) [14], two customized questions about PA behavior, and one customized question about perceived ability to self-manage one's health.

2.2 | RAPA

The RAPA is a self-reported, nine-item questionnaire using a dichotomous (yes/no) format to inquire about PA. It was developed for use among patients over the age of 50 years [4]. The RAPA includes a brief introduction in text and with pictorial representations to explain differences in PA intensity levels (light, moderate, and vigorous). The questionnaire items are structured in two sections: The first seven questions (RAPA-A) assess aerobic PA, and the remaining questions (RAPA-S) evaluate activities for muscle strengthening and to improve flexibility.

To score RAPA-A, responses are coded onto a 5-point categorization scale based on the highest question (1–7) marked with a “yes”. This results in an ordinal categorization of the respondent to “sedentary” (Question 1), “under-active” (Question 2), “under-active regular—light activities” (Question 3), “under-active regular” (Questions 4 and 5), and “active” (question 6 and 7). RAPA-S responses are categorized separately for muscle strengthening (yes/no) and activities to improve flexibility (yes/no).

2.3 | EuroQol Health-Related Quality of Life (HRQoL) Questionnaire

The EuroQol questionnaire [14] is a self-report measure of HRQoL, which has shown to be negatively associated to PA levels [15]. The EuroQol questionnaire assesses five HRQoL domains (mobility, self-care, daily activities, pain/discomfort, anxiety/depression) on a 5-point ordinal scale (“no problems” to “unable/extreme”). Additionally, it assesses overall health status using a visual analogue scale (EQ-VAS), which uses a vertical line with endpoints of 0 (*worst health*) to 100 (*best health*).

2.4 | PA Questions

Two fill-in-the-blank questions inquired about PA frequency (“How many times per week were you physically active?”) and volume (“How long on average were you physically active per week?”) during the past 4 weeks.

2.5 | Self-Management Question

Greater self-health perception, specifically belief in the ability to control one's health, has been associated with increased PA

engagement [16]. Hence, we assessed perceived ability to manage one's health using a customized question ("How confident are you in your ability to manage your own health?") with a 4-point Likert scale response (very confident, somewhat confident, somewhat not confident, not at all confident).

2.6 | Statistical Analysis

Descriptive analysis using mean and standard deviation (SD) for continuous variables, and frequencies and percentages (n , %) for categorical variables was conducted.

To examine the convergent validity of this version of the RAPA, we hypothesized that there would be a positive correlation between the RAPA-A and minutes and frequency of PA per week, as well as perceived health status via the EQ-VAS. Additionally, we hypothesized that the RAPA-A would be negatively correlated to greater health difficulties as measured by the EuroQol health domains and lower confidence to manage one's own health. These hypotheses were tested using Spearman's correlation coefficients (ρ) with level of significance at $p < 0.05$. A moderate correlation of ≥ 0.3 was considered acceptable for construct validity, as based on prior literature [7, 10, 17]. All Spearman's correlations were carried out in RStudio using R version 4.2.1 (R Foundation for Statistical Computing, Vienna, Austria).

2.7 | Ethical Considerations

The study received ethical approval of the responsible regional medical research ethics committees [12, 13]. This included ethical approval from three regional research ethics committees (Ethikkommission des Landes Kärnten (reference M2022-27), Ethikkommission der Medizinischen Fakultät der Johannes Kepler Universität (reference 1078/2022), and Ethikkommission für das Bundesland Niederösterreich (reference GS1-EK-4/795-2022), and one regional committee (Ethikkommission des Landes Vorarlberg, reference EK-0.04–397) waived the need for formal ethics.

The studies on which we base our analysis have been reported according to the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) guidelines [18]. In addition, we follow guidelines for the reporting of statistics for clinical research [19].

3 | Results

3.1 | Participant Characteristics

Participant characteristics are presented in Table 1. According to the RAPA, 67% of respondents met the WHO recommendation for aerobic PA, 39% carried out muscle-strengthening activities at least once per week, and 65% performed activities to improve flexibility at least once per week. However, only approximately a quarter (26%) of respondents reported *both* aerobic and muscle-strengthening activities. The average (mean, SD) weekly frequency and volume of PA were 4 ± 4 times and 6.5 ± 8 h per week, respectively. In the EQ-VAS, participants reported an average

perceived health score of 74 ± 16 out of 100, with higher scores indicating better health. Moreover, 43% of participants expressed strong confidence in their ability to manage their own health, 49% were rather confident, and 8% rather not confident.

3.2 | Validation

The RAPA-A showed moderate positive correlations to both weekly frequency of PA ($\rho = 0.31$, 95% CI [0.18, 0.43], $p < 0.001$) and weekly volume of PA ($\rho = 0.34$, 95% CI [0.21, 0.45], $p < 0.001$). Moreover, the RAPA-A displayed weak negative correlations with four of five HRQoL domains of the EuroQol questionnaire (Table 2). Lastly, the RAPA-A showed a weak positive correlation to perceived health as measured by the EQ-VAS, and a weak negative correlation to lack of confidence in managing one's own health ($\rho = -0.27$, 95% CI [-0.39, -0.14], $p < 0.001$).

4 | Discussion

Our findings support the convergent validity of the new German translation of the RAPA for Austria and align with prior psychometric validations of RAPA translations to other languages. For instance, the Turkish version of the RAPA reported positive correlations between RAPA-A and the Physical Activity Scale for the Elderly (PASE) ($\rho = 0.49$), as well as the International Physical Activity Questionnaire-Short Form (IPAQ-SF) total score ($\rho = 0.64$) [7]. The Hungarian version similarly showed positive correlations between RAPA-A and the long version of the IPAQ ($\rho = 0.54$) [6]. In the original English version, RAPA-A was positively correlated with the long-form Community Healthy Activities Model Program for Seniors (CHAMPS) moderate caloric expenditure ($\rho = 0.54$) and total calories ($\rho = 0.48$) [4].

Although in alignment with prior results, the strength of our correlations is somewhat weaker. A potential reason for this difference is that we did not employ a detailed gold-standard measure of PA as in the above examples. Suitable gold standards of PA would be validated, standardized, detailed PA questionnaires, such as IPAQ or objective measurements using accelerometry. Participants may have had different interpretations for physically active minutes or difficulties recalling active minutes. Despite this, we report a moderate correlation comparable to the Mexican-Spanish validation of the RAPA (i.e., a correlation of 0.45 between the RAPA and accelerometer data) [8]. It is plausible that our correlations with frequency and volume of PA would be stronger with a more defined or direct comparison measure of PA (e.g., accelerometry). Furthermore, our findings that lower PA levels are associated with lower HRQoL are mirrored in prior findings [15, 20].

We acknowledge the limitations to this analysis including its bias toward men and likely bias towards healthy and less disabled individuals who completed the survey. For future validation of the German-translated RAPA, it would be recommended to validate with a diverse sample.

One of the actions proposed in the WHO global action plan on PA refers to "patient *assessment* and counseling on increasing PA and reducing sedentary behavior, by appropriately trained health, community and social care providers" [21].

TABLE 1 | Participant characteristics.

Characteristic	Categories	Descriptive ^a
Age (years) (<i>N</i> = 225)		69 ± 11
Gender (<i>N</i> = 232)	Female	53 (23)
	Male	179 (77)
Marital status (<i>N</i> = 229)	Single	16 (7)
	Partnership	14 (6)
	Married or registered partnership	169 (74)
	Widowed	20 (9)
	Divorced or dissolved registered partnership	10 (4)
Education level (<i>N</i> = 232)	Mandatory school (completion of nine years of school)	23 (10)
	High school degree (completion of 12 years of school)	31 (13)
	Apprenticeship with vocational school	87 (38)
	Technical or commercial school	36 (16)
	University or technical college degree	40 (17)
	Other	16 (7)
Employment status (<i>N</i> = 230)	Employed	50 (22)
	Unemployed	3 (1)
	Retired	172 (75)
	Permanently unable to work	1 (0.4)
	Other	4 (2)
Smoking status (<i>N</i> = 229)	Lifelong nonsmoker	89 (39)
	Ex-smoker	123 (54)
	Since (years), mean (SD)	24 ± 17
	Smoker	13 (6)
	Angina pectoris	22 (10)
Cardiovascular medical history (<i>N</i> = 231) ^b	Coronary bypass surgery	34 (15)
	Cardiac arrhythmias	26 (11)
	Heart failure	39 (17)
	Heart valve surgery	26 (11)
	Myocardial infarction	70 (30)
	Percutaneous coronary intervention	119 (52)
	Pacemaker	8 (3)
Body mass index (kg/m ²) (<i>N</i> = 230)		27 ± 4
Frequency of PA/week (<i>N</i> = 227)		4 ± 4
Minutes of PA/week (<i>N</i> = 223)		387 ± 485
RAPA-A (<i>N</i> = 230)	Sedentary	2 (1)
	Underactive	2 (1)
	Regular underactive (light activities)	26 (11)
	Regular underactive	47 (20)
	Regular active ^c	153 (67)
RAPA-S (<i>N</i> = 207)	Muscle strengthening activities	81 (39)
	Activities to improve flexibility	135 (65)
	Both	66 (32)

Abbreviations: PA, physical activity; RAPA, Rapid Assessment of Physical Activity questionnaire.

^aFigures are mean ± standard deviation or *n* (%).^bMultiple responses permissible.^cThirty minutes or more per day of moderate PAs on 5 or more days per week; or 20 min or more per day of vigorous PAs on 3 or more days per week.

TABLE 2 | Correlation between EuroQol questionnaire items and RAPA-A.

EuroQol item	Frequency distribution across EQ-5D-5L categories (n, %)					Unable/ extreme	Spearman's ρ	p value	95% CI
	No problems	Slight problems	Moderate problems	Severe problems					
Mobility	149 (64)	37 (16)	35 (15)	11 (5)		1 (0.4)	−0.25**	<0.001	−0.37, −0.12
Self-care	213 (93)	12 (5)	3 (1)	2 (1)		—	−0.15*	0.02	−0.28, −0.02
Usual activities (e.g., work, housework, family)	169 (73)	44 (19)	14 (6)	6 (3)		—	−0.27**	<0.001	−0.39, −0.14
Pain/discomfort	68 (29)	96 (41)	61 (26)	8 (3)		1 (0.4)	−0.17*	0.01	−0.29, −0.04
Anxiety/depression	150 (65)	60 (26)	14 (6)	7 (3)		—	−0.02	0.70	−0.15, 0.11
EQ-VAS (mean, SD)	74 ± 16						0.23**	<0.001	0.10, 0.35

Abbreviation: CI, confidence interval.
* $p < 0.05$; ** $p < 0.001$.

Our validation of the German RAPA constitutes a small contribution towards this action for the Austrian context.

This secondary analysis of survey data has contributed to the psychometric validation of the new German version of the RAPA for Austria. A future dedicated psychometric validation study of the German RAPA against detailed gold-standard PA questionnaires or direct PA measures (e.g., accelerometry) is warranted.

Author Contributions

Hannah McGowan: data curation, formal analysis, visualization, writing—original draft. **Rik Crutzen:** conceptualization, project administration, supervision, validation, writing—review and editing. **Tari Topolski:** Conceptualization, supervision, validation, writing—review and editing. **Stefan Tino Kulnik:** conceptualization, project administration, supervision, validation, writing—review and editing.

Acknowledgments

We thank the cardiac rehabilitation centers and their former patients who took part in the survey.

Disclosure

The sponsor, Ludwig Boltzmann Gesellschaft, Austria, had no influence on the design, analysis, or interpretation of the study.

Conflicts of Interest

The authors declare no conflicts of interest.

Data Availability Statement

All data are available from the Open Science Framework (OSF) database at DOI [10.17605/OSF.IO/HCVFM](https://doi.org/10.17605/OSF.IO/HCVFM).

Transparency Statement

The lead author Hannah McGowan affirms that this manuscript is an honest, accurate, and transparent account of the study being reported; that no important aspects of the study have been omitted; and that any discrepancies from the study as planned (and, if relevant, registered) have been explained.

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