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Original Article

Adaptive performance scale: Translation and validation in English and Dutch

Marcel Krijgsheld [a,*], Lars (L.G.) Tummers [a,b], Floortje (F.E.) Scheepers [c]

[a] School of Governance, Utrecht University, Utrecht, the Netherlands
[b] Visiting Professsor from the City University of Hong Kong, Hong Kong
[c] University Medical Centre Utrecht, Utrecht, the Netherlands

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ABSTRACT

The significance of adaptive performance in today's rapidly evolving work environment cannot be overlooked. Despite its crucial nature, no validated scale exists for assessing adaptive performance in either English or Dutch. This project aims to rectify this deficiency by providing researchers with a reliable and validated instrument to measure adaptive performance. The French scale was translated into English and Dutch using forward and backward translation techniques and was pretested by healthcare professionals. A uniform interpretation of the translations was achieved, and the final questionnaires were distributed to healthcare professionals. We explored the dimensionality of the scales using factor analysis and tested for reliability and validity. Questionnaires were completed by 283 English-speaking and 306 Dutch-speaking respondents. Both questionnaires demonstrated good internal consistency (Cronbach's alpha 0.87) and convergent and discriminant validity. Minor issues were addressed. This analysis presents a dependable and legitimate tool for the further exploration of adaptive performance. The primary focus of this project was on healthcare professionals. Given that the original scale was evaluated across various occupations and the items were worded in general terms, the scale could be applied generally. This project successfully addressed the need for a scale on adaptive performance for researchers conducting studies with English or Dutch respondents.

Introduction

Adaptive performance refers to the extent of responsibility for changing employees' task requirements and work environments (Griffin et al., 2007; Shoss et al., 2012). Change is inevitable and is the only constant variable in the world of work (Self & Schraeder, 2009). The accelerating pace of change drives organizations to act on these changes (Sorensen et al., 2021). Considering these demands, adaptive performance is essential for employees (Jundt et al., 2015).

The coronavirus disease 2019 (COVID-19) pandemic is a recent example of task requirements and work environments requiring behavioral changes. For example, primary care physicians exhibited adaptive performance in response to the COVID-19 outbreak (Haruta et al., 2021). Moreover, in Sweden, secondary school teachers swiftly transitioned into remote teaching due to the outbreak of COVID-19 (Bergdahl, 2022). These are examples of how people express their adaptive performance in response to change. Hence, if someone is not responsive to change, it could lead to technostress, for example, in coping with the technology used in remote work, which has enormously expanded since COVID-19 (Bahamondes-Rosado et al., 2023).

Adaptive performance is also critical for less drastic changes. For example, the use of electronic patient records also requires behavioral adjustments (Raglan et al., 2015). The change to "appropriate care" to keep care accessible and affordable, as described by the Dutch government in an action plan: "Samenwerken aan passende zorg de toekomst is nu" (Working together on appropriate care: the future is now), leads to changes in tasks and work environments, requiring the responsiveness of those involved (Kaljouw & Wijma, 2020).

These changes have led to an increasing interest in adaptive performance among academic researchers and practitioners (Pulakos et al., 2000). Scholars have shifted focus to behaviors that reflect the extent to which individuals respond to changes in task requirements and work environments (Allworth & Hesketh, 1999; Campbell, 1999; Griffin et al., 2007; Hesketh & Neal, 1999). These changes asks workers to be

Abbreviations: AVE, average variance extracted; CR, composite reliability; HTMT, hetero-trait to mono-trait; KMO index, Kaiser–Meyer–Olkin index.

* Corresponding author.
E-mail address: m.krijgsheld@uu.nl (M. Krijgsheld).

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Table 1
English translation before and after the preliminary pilot test.

Dimensions	Before preliminary pilot testing	After preliminary pilot testing
Creativity	I do not hesitate to go against certain well-established ideas in order to suggest an innovative solution.	I do not hesitate to go against certain well-established ideas in order to suggest an innovative solution.
	In my department, people rely on me to offer new solutions.	In my department, people rely on me to offer new solutions.
	I take into account a wide variety of information to find an innovative solution.	I take into account a wide variety of information to find an innovative solution.
	I develop new tools and methods to resolve new problems.	I develop new tools and methods to resolve new problems.
Reactivity in the face of emergencies	I am able to focus all my attention on the situation in order to act quickly.	I am able to focus all my attention on the situation in order to act quickly.
	I quickly decide on the actions to take to resolve problems.	I quickly decide on the actions to take to resolve problems.
	I quickly analyze the possible solutions and their implications in order to choose the most suitable one.	I quickly analyze the possible solutions and their implications in order to choose the most suitable one.
	I easily reorganize my work to adapt to the new situation.	I easily reorganize my work to adapt to new situations.
Interpersonal adaptability	I develop good relations with all my partners as it is an important element for my efficiency.	I develop good relations with all my ***counterparts*** as it is an important ***factor of my effectiveness.***
	I look to understand the points of view of my interlocutors in order to be able to better exchange with them.	I ***try to*** understand the viewpoints of my ***counterparts*** to ***improve my interaction with them.***
	To better collaborate with all partners at work, I learn new ways of doing my job.	To better collaborate with all ***counterparts*** at work, I learn new ways of doing my job.
	I am willing to adjust my behavior when it comes to working with these people.	***I willingly adapt my behavior whenever I need to in order to work well with others.***
Training and learning efforts	I regularly undertake training courses, inside or outside the company, to keep my skills up to date.	I regularly undertake training courses, inside or outside the company, to keep my skills up to date.
	I am on the lookout for the latest innovations in my professional field to improve the way I work.	I am on the lookout for the latest innovations in my professional field to improve the way I work.
	I look for all the opportunities that enable me to develop my performance (training, working groups, exchanges with colleagues, etc.)	I look for all the opportunities that enable me to develop my performance (training, working groups, exchanges with colleagues, etc.)
	I prepare for change by participating in any possible project or mission that enables me to do so.	I prepare for change by participating in any possible project or mission that enables me to do so.
Managing workstress	I keep calm in challenging situations where I have to make a lot of decisions.	I keep calm in challenging situations where I have to make a lot of decisions.
	I look for solutions by having quiet and constructive discussions with my colleagues.	I look for solutions by having quiet and constructive discussions with my colleagues.
	Through my advice and my behavior, I help my colleagues to control their stress.	Through my advice and my behavior, I help my colleagues to control their stress.

Note: Changes in the items after preliminary pilot testing are in bold italics.

increasingly adaptable, versatile, and tolerant to uncertainties, which can lead to new or altered task demands (Pulakos et al., 2002). Further research on adaptive performance is necessary to address the increasing changes in task requirements and work environments adequately. For example, a systematic review of job performance in healthcare revealed that limited scientific research has been conducted on the adaptive performance of healthcare professionals (Krijgsheld et al., 2022). Nonetheless, the healthcare sector is possibly one of the most critical areas in which changes and improvements in organizational performance are necessary (Becton et al., 2009).

Based on the adaptive performance construct proposed by Pulakos et al. (2000); Charbonnier-Voirin and Roussel (2012) developed a scale to provide researchers with a generally available multidimensional scale of adaptive performance. However, this scale has been validated in France and is not widely applicable. We were unable to locate a translated and validated version of Charbonnier-Voirin and Roussel's (2012) Individual Adaptive Performance Scale in English or Dutch. Although there are scales related to adaptive performance, these scales are not freely available (Griffin & Hesketh, 2005; Pulakos et al., 2000) or are limited to a specific context (De Jong & De Ruyter, 2004). Because of the importance of research on adaptive performance considering changes in task requirements and work environments, this project aims to translate and validate the original French scale into English and Dutch.

Theoretical framework

Academic researchers and practitioners in organizations have increasingly become interested in adaptability, where the classic classification of job performance (i.e., task and contextual performance) reflects a static view, and adaptive performance reflects the extent to which people are responsive to changes in task requirements and work environments (Shoss et al., 2012). Others have defined adaptive performance as an individual's ability to adapt to dynamic work situations (Hesketh & Neal, 1999) or as adjusting behavior to the requirements of work situations and new events (Pulakos et al., 2000).

Jundt et al. (2015) identified several common themes that overlap in the various conceptualizations of adaptive performance. The first theme is the connection with external induced changes, such as the introduction and use of Electronic Health Record Systems (Raglan et al., 2015). Secondly, they found that adaptive performance is often discussed as a set of behavior to minimize performance decrements. The first theme is about the anticipatory and reactive elements that adaptive performance can have. The final theme concerns changes on the job that may occur to tasks which requires cognitive or skill-based adaption (Jundt et al., 2015). Pulakos et al. (2000) proposed the first global model for adaptive performance, consisting of eight dimensions. These dimensions are (i) deal with uncertain or unpredictable work situations, (ii) handling emergencies or crises, (iii) managing work stress, (iv) solving problems creatively, (v) learning new task technologies and procedures, (vi) demonstrating interpersonal adaptability, (vii) cultural adaptability, and (viii) physically oriented adaptability (Pulakos et al., 2000). In further research, these dimensions were proven to be predictors of adaptive performance and were converted into an assessment tool, the *Job Adaptability Inventory* (Pulakos et al., 2002). However, these items are generally unavailable because the model is marked for use on a consulting basis (Charbonnier-Voirin & Roussel, 2012).

Charbonnier-Voirin and Roussel (2012) developed a scale of adaptive performance, validated in French, based on the model by Pulakos et al. (2002), which is freely available to researchers. The dimension demonstrating physical adaptability was deleted because of its poor internal consistency (Cronbach's alpha 0.35). The exploratory analysis resulted in the revaluation of some dimensions. The items representing interpersonal and cultural adaptability loaded on a single factor were merged into one dimension, "interpersonal adaptability." The

Table 2
. Dutch translation before and after preliminary pilot testing.

Dimensions	Before preliminary pilot testing	After preliminary pilot testing
Creativity	Ik aarzel niet om tegen gevestigde ideeën in te gaan om een vernieuwende oplossing voor te stellen.	Ik aarzel niet om tegen gevestigde ideeën in te gaan om een vernieuwende oplossing voor te stellen.
	Op mijn afdeling, rekent men op mij voor het aandragen van nieuwe oplossingen.	Op mijn afdeling rekent men op mij voor het aandragen van nieuwe oplossingen.
	Ik integreer informatie van uiteenlopende bronnen om tot innovatieve oplossingen te komen.	Ik integreer ***een breed scala aan informatie om een*** innovatieve oplossing te ***vinden.***
	Ik ontwikkel nieuwe hulpmiddelen en methoden om nog nooit eerder voorgekomen problemen op te lossen.	Ik ontwikkel nieuwe ***werkwijzen om deze nieuwe*** problemen op te lossen.
Reactivity in the face of emergencies	Het lukt mij al mijn focus te richten op de situatie die zich voordoet om zo snel te handelen.	***Ik ben in staat om al mijn aandacht*** te richten op de situatie die zicht voordoet ***en*** zo snel te handelen.
	Ik beslis snel welke acties ik moet nemen om een probleem op te lossen.	Ik beslis snel welke acties ik moet nemen om een probleem op te lossen.
	Ik analyseer snel mogelijke oplossingen en hun gevolgen om de meest geschikte oplossing te kiezen.	Ik analyseer snel mogelijke oplossingen en hun gevolgen om de meest geschikte oplossing te kiezen.
	Ik kan mijn werk makkelijk aanpassen aan een nieuwe situatie.	Ik kan mijn werk makkelijk aanpassen aan een nieuwe situatie.
Interpersonal adaptability	Ik ontwikkel een goede relatie met al mijn gesprekspartners want dat is een belangrijk element voor mijn bekwaamheid.	Ik ***onderhoud goede betrekkingen*** met al mijn gesprekspartners ***omdat*** dat belangrijk is voor mijn ***effectiviteit.***
	Ik probeer de meningen van mijn gesprekspartners te begrijpen om de communicatie met hen te verbeteren.	Ik probeer de ***gezichtspunten*** van mijn gesprekspartners te begrijpen om de communicatie met hen te verbeteren.
	Ik leer nieuwe werkwijzen om beter te kunnen samenwerken met anderen.	***Om beter samen te werken met deze mensen, leer ik nieuwe manieren van werken.***
	Ik pas mijn gedrag graag aan om met anderen samen te werken.	Ik pas mijn gedrag graag aan om met anderen samen te werken.
Training and learning effort	Ik laat me regelmatig bijscholen binnen en buiten de organisatie waar ik werk, om zo mijn vaardigheden bij te houden.	Ik laat me regelmatig bijscholen binnen en buiten de organisatie waar ik werk, om zo mijn vaardigheden bij te houden.
	Ik houd de laatste ontwikkelingen in mijn vakgebied nauwlettend in de gaten om mijn werkwijze te verbeteren.	Ik houd de laatste ontwikkelingen in mijn vakgebied nauwlettend in de gaten om mijn werkwijze te verbeteren.
	Ik grijp alle mogelijkheden aan om mijn prestaties te verbeteren (scholing, werkgroepen, uitwisselingen met collega's etc.).	Ik grijp alle mogelijkheden aan om mijn prestaties te verbeteren (scholing, werkgroepen, uitwisselingen met collega's etc.).
	Ik bereid mij voor op verandering door deel te nemen aan elk project en elke opdracht die daarop aansluit.	Ik bereid mij voor op verandering door deel te nemen aan elk project en elke opdracht die daarop aansluit.
Managing work stress	Ik blijf kalm in situaties waarin ik veel beslissingen moet nemen.	Ik blijf kalm in situaties waarin ik veel beslissingen moet nemen.
	Ik zoek naar oplossingen door rustig met mijn collega's het gesprek aan te gaan.	Ik zoek naar oplossingen door rustig met mijn collega's het gesprek aan te gaan.
	Door mijn adviezen en gedrag help ik mijn collega's hun stress onder controle te houden.	Door mijn adviezen en gedrag help ik mijn collega's hun stress onder controle te houden.

Note: Changes in the items after preliminary pilot testing are in bold italics.

dimension of "dealing with uncertain and unpredictable work situations" was loaded on "handling emergencies and crises." These dimensions were also merged into one dimension: "reactivity in the face of emergencies" (Charbonnier-Voirin & Roussel, 2012). With one deleted dimension, merging two dimensions with other dimensions resulted in a scale of adaptive performance consisting of five dimensions: creativity, reactivity in the face of emergencies, interpersonal adaptability, training and learning efforts, and managing work stress (Charbonnier-Voirin & Roussel, 2012).

Creativity refers to the ability to determine new methods of dealing with complex or unknown problems. Reactivity in the face of emergencies refers to the ability to cope with unexpected situations in which people manage priorities and adapt to new situations. Interpersonal adaptability refers to workers' abilities to vary their interpersonal styles to effectively collaborate with others, either within or outside their organizations. Training and learning efforts involve initiating actions to promote personal skill development. Managing work stress reflects an individual's ability to maintain calm and handle team stress (Charbonnier-Voirin & Roussel, 2012).

Methods

We followed the method used for translation and validation of the study by Tsang et al. (2017) (Appendix A). This method describes the development of questionnaires and the translation of validated questionnaires into other languages. Tsang et al. (2017) distinguished between three stages: preliminary consideration, development or translation, and validation.

Preliminary consideration

In the first stage, we examined the construct of interest and whether a validated questionnaire was available. In this study, the construct of interest was individual adaptive performance, and a validated scale was available in a language (French) other than the intended languages (English and Dutch). The available validated scale of adaptive performance concerns the scale on individual adaptive performance, according to Charbonnier-Voirin and Roussel (2012). This ordinal scale consists of nineteen items on a 7-point Likert scale ranging from 1 (strongly disagree) to 7 (strongly agree).

Translation process

The second stage involved the development or translation of a validated questionnaire based on the outcome of the preliminary consideration. As the questionnaire was validated in a different language, a translation process was conducted. The translations consisted of four steps: establishing an expert committee, forward translation to the target language, backward translation to the original language (French), and preliminary pilot testing.

French–Dutch translation

The expert committee comprised the second author of the original scale of adaptive performance (Charbonnier-Voirin & Roussel, 2012), backward translators, and the first author of this study. Forward translation was performed by at least two independent translators (Guillemin et al., 1993). The original version was translated from French into the target language by eight university students under supervision of an assistant professor of the department of French literature and culture. The context of the translation can lead to subtle differences in translation (Beaton et al., 2000); thus, the students were divided into two groups: four students were aware of the context of the adaptive performance scale, and four other students were not aware of this context.

Table 3
Descriptive statistics and correlation (spearman) between the dimensions of adaptive performance.

Dimension	$N = 283$		$N = 306$		1	2	3	4	1	2	3	4
	Mean English	(SD)	Mean Dutch	(SD)	English				Dutch			
1. Creativity	5.73	(0.76)	4.78	(0.91)								
2. Reactivity in the face of emergencies	5.28	(0.86)	5.63	(0.72)	0.471**				0.302**			
3. Interpersonal adaptability	6.13	(0.60)	5.89	(0.65)	0.343**	0.283**			0.224**	0.342**		
4. Training and learning effort	5.87	(0.81)	5.09	(0.94)	0.488**	0.403**	0.414**		0.471**	0.305**	0.350**	
5. Managing work stress	5.68	(0.70)	5.47	(0.71)	0.399**	0.337**	0.492**	0.372**	0.356**	0.481**	0.386**	0.391**

** Correlation is significant at the 0.01 level (two-tailed).
SD = standard deviation.

Table 4
Result of exploratory factor analyses (principal axes factoring with promax rotation).

Items	N = 283, KMO = 0.86					N = 306, KMO = 0.84				
	Bartlett test of Sphericity < 0.001					Bartlett test of Sphericity < 0.00				
	English					Dutch				
	Factor					Factor				
	1	2	3	4	5	1	2	3	4	5
I do not hesitate to go against certain well-established ideas in order to suggest an innovative solution.	0.556					0.616				
In my department, people rely on me to offer new solutions.	0.448					0.679				
I take into account a wide variety of information to find an innovative solution.	0.817					0.589				
I develop new tools and methods to resolve new problems.	0.627					0.607				
I am able to focus all my attention on the situation in order to act quickly.		0.513					0.708			
I quickly decide on the actions to take to resolve problems.		0.821					0.806			
I quickly analyze the possible solutions and their implications in order to choose the most suitable one.		0.847					0.720			
I easily reorganize my work to adapt to new situations.		0.393					0.526			
I develop good relations with all my counterparts as it is an important factor of my effectiveness.			0.595					0.591		
I try to understand the viewpoints of my counterparts to improve my interaction with them.			0.780					0.784		
To better collaborate with all counterparts at work, I learn new ways of doing my job.			0.513					0.527		
I willingly adapt my behavior whenever I need to in order to work well with others (only in the English version).			0.588							
I regularly undertake training courses, inside or outside the company, to keep my skills up to date.				0.639					0.693	
I am on the lookout for the latest innovations in my professional field to improve the way I work.				0.800					0.700	
I look for all the opportunities that enable me to develop my performance (training, working groups, exchanges etc.).				0.898					0.922	
I prepare for change by participating in any possible project or mission that enables me to do so.				0.500					0.541	
I keep calm in challenging situations where I have to make a lot of decisions.					0.357					0.724
I look for solutions by having quiet and constructive discussions with my colleagues.					0.549					0.557
Through my advice and my behavior, I help my colleagues to control their stress.					0.398					0.566
I feel at ease even if my tasks change and occur at a very fast pace (only in Dutch).										0.419
Cronbach's alpha by dimension	0.73	0.75	0.75	0.82	0.58	0.73	0.78	0.70	0.81	0.73
Eigenvalue	1.45	1.16	2.03	6.03	0.97	1.66	2.11	1.37	5.72	1.14
Cronbach's alpha for scale	0.87					0.87				

KMO, Kaiser–Meyer–Olkin.

The students discussed their translations, which resulted in two target-language translations, with one based on contextual information. Two bilingual speakers, with French as their mother language, independently translated the Dutch translations back into their original language. During this process, the back-translators were unaware of the context and purpose of the measurement to avoid bias (Guillemin et al., 1993). The expert committee reviewed all versions of the translations to determine whether the translated and original versions achieved semantic, idiomatic, experiential, or conceptual equivalence (Beaton et al., 2000). All discrepancies were discussed by the expert committee, which reached a consensus on all items.

French–English translation

We engaged a translation agency because we were unable to find an English-speaking university with a French faculty willing to participate in this translation process. This translation agency translated the French version into English. The translated but unvalidated English version used for publication in the *Canadian Journal of Administrative Sciences* was employed for the forward and backward processes. Both English versions were translated back into French by two independent native speakers through this translation agency. The results of the translations were discussed with the second author of the original scale and the first author of the study, and there was consensus on all items.

Table 5
. Discriminant validity of dimensions based on the hetero-trait to mono-trait ratio.

Dimensions	English	Dutch
Creativity and reactivity in the face of emergencies	0.64	0.42
Creativity and interpersonal adaptivity	0.48	0.37
Creativity and training and learning effort	0.66	0.63
Creativity and managing work stress	0.58	0.45
Reactivity in the face of emergencies and interpersonal adaptivity	0.35	0.48
Reactivity in the face of emergencies and training and learning effort	0.52	0.36
Reactivity in the face of emergencies and managing work stress	0.53	0.66
Interpersonal adaptivity and training and learning effort	0.70	0.47
Interpersonal adaptivity and managing work stress	0.72	0.57
Training and learning effort and managing work stress	0.54	0.48

Table 6
Reliability and convergent validity indices of adaptive performance.

	English ($N = 283$)		Dutch ($N = 306$)	
Dimensions	AVE	CR	AVE	CR
Creativity	0.55	0.83	0.54	0.83
Reactivity in the face of emergencies	0.56	0.83	0.59	0.85
Interpersonal adaptability	0.55	0.83	0.60	0.82
Training and learning effort	0.66	0.88	0.62	0.87
Managing work stress	0.50	0.75	0.53	0.82
Overall Scale	0.57	0.96	0.58	0.96

AVE, average variance extracted; CR, composite reliability.

Preliminary pilot testing

Through preliminary pilot testing, this preliminary final version was distributed to a sample of 30 to 50 (Perneger et al., 2015) intended respondents (Beaton et al., 2000; Guillemin et al., 1993). In open-ended questionnaires, respondents were asked to elaborate on what they thought each questionnaire item and their corresponding responses meant (Tsang et al., 2017). This approach provides insight into the extent to which the items are interpreted in the same way and whether they still have the meaning of the original questionnaire.

Exploratory factor analysis

We examined whether the data were normally distributed by determining the skewness. A skewness between ±1 is considered normally distributed (Hair et al., 2022). To assess the factorability of the scale we measured Kaiser–Meyer–Olkin (KMO) and Bartlett test of Sphericity. A KMO of 0.80 or above and a Bartlett test of Sphericity $<$ 0.001 indicates that data is suitable for factor analyses (Shrestha, 2021). A Bartlett test of Sphericity $<$ 0.001 also implies that the data is not orthogonal (Shrestha, 2021). This indicates the use of oblique rotation in factor analyses (Field, 2013). Because the KMO of both scales was above 0.80 and the significance level of the Bartlett test of Sphericity was $<$0.001 the data was suitable for factor analyses. We conducted principal factor analyses (principal axes factoring) with oblique rotation (promax) because factors within are expected to be related (Field, 2013). A widely recognized criterion to identify the correct numbers of factors is the Kaiser–Guttman rule (Kaiser, 1960) It simply states that the number of factors is equal to the number of factors with eigenvalues greater than 1.0. (Kaiser, 1960; Shrestha, 2021). Although others discuss this statement is to strict (Field, 2013; Preacher & MacCallum, 2003)

Reliability and convergent and discriminant validity

Finally, the reliability and validity of the translated questionnaires were tested using a larger sample of at least 50 to 80 intended respondents (Hertzog, 2008). Although it could be expected that a translation of a reliable and valid instrument would result in a reliable and valid translated version, this result is not guaranteed. Therefore, it is recommended that the reliability and validity be tested (Beaton et al., 2000).

The reliability of the scale was measured using Cronbach's alpha, which measures the internal consistency of the scale and its subscales (Cronbach, 1951). Internal consistency describes the extent to which all items in a test measure the same concept or construct. It is expressed as a number between 0 and 1, where a Cronbach's alpha above 0.70 indicates good internal consistency (Tavakol & Dennick, 2011). Convergent validity was assessed on the subdomains using the average variance extracted (AVE) and composite reliability. An AVE above 0.50 indicates convergent validity, meaning that the domains measure the same construct (Chin & Yao, 2014). Composite reliability should be above 0.60 (Lam, 2012; Shrestha, 2021). Discriminant validity was verified using the hetero-trait to mono-trait ratio (HTMT) of correlations, where an HTMT ratio below 0.85 or 0.90 indicates no problems related to discriminant validity (Henseler et al., 2015).

Some researchers have claimed that adaptive performance overlaps with contextual performance (Johnson, 2001). Contextual performance maintains broader organizational, social, and psychological environments and includes such activities as cooperating with others and persisting with enthusiasm when necessary (Motowidlo et al., 1997). Therefore, we used the HTMT ratio to measure the discriminant validity of the subscales within the construct of adaptive performance and to evaluate the discriminant validity between the constructs of adaptive and contextual performance. The subscale for contextual performance of the Individual Work Performance Scale (Koopmans et al., 2011) was used for this purpose.

Since the creativity subscale contains items that also appeal to innovativeness, we examined the degree of difference between the subscale creativity and the construct of innovative work behavior (Janssen, 2000). The contextual performance subscale consists of eight items on a 5-point Likert scale ranging from 1 (seldom) to 5 (often). Moreover, the Innovative Work Behavior Scale consists of nine items rated on a 7-point Likert scale ranging from 1 (never) to 7 (always).

Participants

Preliminary pilot testing and the pilot test should be conducted with the intended respondents (Tsang et al., 2017). The final goal of this translation and validation process was to study the adaptive performance of healthcare professionals. Therefore, healthcare professionals

were requested to complete the questionnaire. In the preliminary pilot study, the researcher directly approached the professionals. For validation, the questionnaire was distributed to healthcare professionals through managers in healthcare organizations, associations for healthcare professionals, and social media. Although there are no absolute rules for sample sizes, at least 200 responders is about fair and 300 is considered as good (Comrey & Lee, 2013; Tsang et al., 2017). With respectively 283 and 306 respondents for the validation of the English and Dutch translation we meet these criteria.

Ethical considerations

Before the initiation of the study, approval was obtained from the Ethics Committee (2021–14). Each participant was provided with an information letter. After consent, participants were able to complete the questionnaire. Participation in the study was voluntary, and participants could refuse or quit at any time. Confidentiality was guaranteed for each respondent, as the data were collected anonymously.

Results

The process of forward and backward translation resulted in the English and Dutch versions of the original scale. These versions were first preliminarily evaluated, and after a few adjustments, the items were distributed among healthcare professionals for validation.

Preliminary pilot testing

The preliminary pilot test was completed by 10 native English-speaking and 28 Dutch-speaking respondents, primarily nurses. The answers to the open items led to reconsidering how some items were formulated. These considerations were discussed by the coauthor of the original scale, resulting in the restructuring of several items.

Feedback was received from respondents who participated in the English translation, primarily regarding words that were not generally used. Some changes were made in response to the feedback. For example, the term "interlocutor" was replaced by "counterparts." "Counterparts" also replaced the word "partner" because this term is generally used in a private social context. Some of the respondents questioned the use of the word "quickly" in some of the items. However, the term "quickly" is vital for a respondent to position themselves on the Likert scale properly. Based on the input of the native English responders and discussions with the coauthor of the original scale, there was no reason to re-evaluate the items with the respondents. Table 1 presents the results.

Some Dutch respondents had difficulties with certain words, such as "all (*alle*)" and "willingly (*graag*)." Despite these difficulties, these words are retained because words like "all" and "willingly" lead to more variation in the answers to the items and discriminate between, for instance, "looking for opportunities" and "looking for *all* opportunities." Some items did require reconstruction based on the feedback, for example, words with the same meaning but where a specific word better matches the intended target group, such as the word "meaning (*mening*)" versus "point of view (*gezichtspunt*)" or "focus (*focus*)" versus "focus (*aandacht*)." Another reconstructed item concerns developing tools and methods (*hulpmiddelen en methoden*). The answers revealed that some respondents had difficulty with the word "tools (*hulpmiddelen*)" because tools were viewed as only materials in the healthcare context. In terms of the motivation for their responses to these items, the respondents primarily reacted to the methods.

Based on the answers to the open items and the discussion with the coauthor of the original scale, the reconstructed items were presented to 23 respondents who were willing to answer the adjusted items. They were asked to express their preferences for either the original or rewritten item. Fourteen respondents indicated their preferences, which resulted in the adjustment of four items (Table 2).

After the preliminary pilot test, the questionnaires were distributed to healthcare professionals through various channels, such as the newsletters of healthcare organizations, nursing associations, and social media posts, to assess their reliability and validity. The questionnaire consists of the five subscales on adaptive performance rated on a 7-point Likert scale from "strongly agree" to "strongly disagree."

Validation

Factor analyses

Data was analyzed using IBM SPSS Statistics for Windows (version 29). Table 3 presents the means, standard deviations, and correlations between the dimensions of adaptive performance.

The data for both sets showed a skewness of −0.686 (English version) and −0.414 (Dutch version) were a skewness between ±1 is considered normal (Hair et al., 2022). The Kaiser–Meyer–Olkin index was above 0.80 and the Bartlett test of Sphericity is <0.001 for both scales, which justifies factor analyses (Hutcheson, 2011; Kaiser & Rice, 1974; Shrestha, 2021). We analyzed it with a fixed number of factors because the original translated construct consists of five factors; therefore, it is expected that the loading is based on these five factors. We applied promax rotation as one of the methods of oblique rotation because total independence between factors is not expected and we worked with a large dataset for which promax is designed (Field, 2013). The factor analysis confirmed the loading on five factors, and the factors were loaded with the items underlying these factors. These five factors account for 61.3 % and 63.1 % of the variance, respectively, with an eigenvalue (Kaiser's criterion) of above 1 for each factor, except the factor loading on stress management in the English scale with an eigenvalue of 0.966.

Reliability

Internal consistency reached a Cronbach's alpha of 0.87 for both scales, which is above the generally accepted threshold of 0.70 (Cronbach, 1951; Field, 2013; Tabri & Elliott, 2012), however, this threshold of 0.70 was not reached for all subscales of the English version. On the subscales of the English version, Cronbach's alpha ranged from 0.58 for managing work stress to 0.82 for training effort. It was 0.73 for creativity, 0.75 for interpersonal adaptability and 0.75 for reactivity in the face of emergencies. Although managing work stress was below the acceptable threshold deleting the item did not increase the reliability of either the subscale or the entire scale.

Due to the weak internal consistency in managing work stress, we added two items to the subscale of the Dutch survey. These items were taken from Pulakos's original questionnaire: "I feel at ease even if my tasks change and occur at a very fast pace" and "Having to take on additional work unexpectedly makes me very anxious" (Pulakos et al., 2000). The second (reverse) item loaded on the factor "reactivity in the face of emergencies;" however, it decreased the Cronbach's alpha of this subscale and was therefore deleted. We also deleted the item "I willingly adapt my behavior whenever I need to in order to work well with others" from the subscale for interpersonal adaptability because deleting this item increased the internal consistency of this scale from 0.63 to 0.70. These adjustments led to a Dutch scale (Appendix B) with a Cronbach's alpha for the subscales at or above the threshold of 0.70 (Table 4).

Discriminant validity

The HTMT ratio was calculated to detect the discriminant validity, measuring the extent to which the scales are distinct. We measured the extent to which the subscales of adaptive performance were distinct from each other and examined the extent to which the construct of adaptive performance differentiated from the construct of contextual performance. An HTMT ratio of 0.90 or lower indicates no discriminant validity problems (Henseler et al., 2015). The construct of adaptive performance was sufficiently distinctive from that of contextual performance with an HTMT ratio of 0.65 (English) and 0.69 (Dutch). The results within the construct of adaptive performance have HTMT ratios

between 0.36 and 0.72, indicating a sufficient distinction between the subscales (Table 5).The creativity subscale was examined in relation to the construct of innovative work behavior to measure the degree of distinction because of the overlapping items on innovation. The HTMT ratio of the subscale creativity and innovative work behavior is with 0.70 (English) and 0.87 (Dutch) below the threshold of 0.90.

Convergent validity

To establish convergent validity, the AVE must be equal to or greater than 0.5, and an acceptable value for composite reliability (CR) must be above 0.6 (Shrestha, 2021). Table 6 reveals that convergent validity was established. The AVE was on or above 0.5, and the composite reliability was for all subscales above 0.60.

Discussion

The process of translation and validation led to a reliable scale of adaptive performance in Dutch and English, free of charge, which can be used for further research on adaptive performance among healthcare professionals. Based on this research, it may also be inferred that the translated scale has broader applicability, as the original scale was administered to respondents from various professional backgrounds, including the telecommunication, aviation, and service industries (Charbonnier-Voirin & Roussel, 2012). In addition, the items were formulated in general terms. Forward and backward translations helped refine the items and contributed to the process of achieving a valid and reliable translation. The reliability of both scales was established with a Cronbach's alpha of 0.87.

However, some problems occurred with the English version of the subscale of managing work stress. A Cronbach's alpha of 0.58 is lower than the acceptable range of 0.70 to 0.80 (Field, 2013), and also the eigenvalue is below 1. This dimension consisted of only three items, which may explain this outcome. Based on the findings, this hypothesis was confirmed by adding an item to the Dutch version that yielded an acceptable α value of 0.73 and an eigenvalue above 1.

Although the subscale for managing work stress in the English version was below the threshold of 0.70, some considerations make this low score acceptable. First, the overall reliability was reasonable, based on a Cronbach's alpha of 0.87. Second, the Dutch version of the added item was increased to an acceptable level. Third, deleting the managing work stress subscale has a negative effect on overall reliability. Finally, discriminant and convergent validity indicated that the scale was well constructed. Nonetheless, it is suggested to add the item "I feel at ease even if my tasks change and occur at a very fast pace" to the English subscale of managing work stress and evaluate the reliability and eigenvalue of this subscale (Appendix C).

In the Dutch scale, we deleted the item "I willingly adapt my behavior whenever I need to in order to work well with others" in the subscale for interpersonal adaptability because of the decreasing effect of this item on the Cronbach's alpha (0.63). During the pretest, certain respondents provided recommendations regarding the term "willingly." In light of the fact that words like this produce more disparate responses, we chose to disregard these requests. However, respondents' answers to this item still seem to have been influenced by the word "willingly," where it played no role in the English scale, which may be indicative of cultural aspects. Removing the item had a positive effect on internal consistency; therefore, there is no reason to include this item in the revised form of the Dutch questionnaire.

The HTMT ratio is below 0.90, indicating no discriminant validity problems (Henseler et al., 2015) on either scale. Data are available from the Open Science Framework.

Limitations

In this project, we translated and validated the individual adaptive performance scale developed by Charbonnier-Voirin and Roussel (2012). The analyses reveal that a significant amount of research has focused more on individual characteristics than on other aspects that affect employees' adaptive performance (Park & Park, 2019). The scales developed in this project can be of immense value for research on individual adaptive performance. If used, it is recommended to explore whether the words used in the questionnaire fit the context of the language area. Although the questions are formulated in general terms, a difference between American English and British English may just make a difference. Hence, in future research, other aspects affecting employees' adaptive performance, such as team and organizational adaptivity, should be considered. Respondents in this project were healthcare professionals, mainly nurses. This could give a distorted view because healthcare professionals consist of many disciplines. However, the items in the survey are so generally described that we conclude that the items can be widely used, even outside the healthcare sector.

Conclusion

Given the results of this research and considering the problems raised in the discussion section, we conclude that adaptive performance scales are helpful for further research on individual adaptive performance in healthcare and beyond in English- and Dutch-speaking countries. As confirmed by Beaton et al. (2000), although it may be expected that the translation of a reliable and valid instrument would result in a reliable and valid translated version, this result is not guaranteed. Adjustments were required for the original questionnaire to arrive at a reliable and valid scale in English and Dutch.

The analyses conducted during this translation and validation process yielded reliable and valid scales for individual adaptive performance. This study fills the gap in the literature on the missing scale for adaptive performance in English and Dutch, providing scholars the opportunity to investigate adaptive performance, which is crucial in constantly changing task requirements and work environments.

Consent for publication

Not applicable.

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Ethical considerations

Before the initiation of the study, approval was obtained from the Ethics Committee (2021–14). Each participant was provided with an information letter. After consent, participants were able to complete the questionnaire. Participation in the study was voluntary, and participants could refuse or quit at any time. Confidentiality was guaranteed for each respondent, as the data were collected anonymously.

CRediT authorship contribution statement

Marcel Krijgsheld: Conceptualization, Formal analysis, Investigation, Methodology, Validation, Writing – original draft, Writing – review & editing. **Lars (L.G.) Tummers:** Conceptualization, Methodology, Supervision, Writing – original draft, Writing – review & editing. **Floortje (F.E.) Scheepers:** Conceptualization, Supervision, Writing – original draft, Writing – review & editing.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

Data are available at https://osf.io/4svn7/?view_only=ced16dbe71f84e1285cd24e18a739e9c.

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Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.hfh.2024.100086.

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