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Career Adapt-Abilities Scale: Construction, reliability, and measurement equivalence across 13 countries

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ABSTRACT

Researchers from 13 countries collaborated in constructing a psychometric scale to measure career adaptability. Based on four pilot tests, a research version of the proposed scale consisting of 55 items was field tested in 13 countries. The resulting Career Adapt-Abilities Scale (CAAS) consists of four scales, each with six items. The four scales measure concern, control, curiosity, and confidence as psychosocial resources for managing occupational transitions, developmental tasks, and work traumas. The CAAS demonstrated metric invariance across all the countries, but did not exhibit residual/strict invariance or scalar invariance. The reliabilities of the CAAS subscales and the combined adaptability scale range from acceptable to excellent when computed with the combined data. As expected, the reliability estimates varied across countries. Nevertheless, the internal consistency estimates for the four subscales of concern, control, curiosity, and confidence were generally acceptable to excellent. The internal consistency estimates for the CAAS total score were excellent across all countries. Separate articles in this special issue report the psychometric characteristics of the CAAS, including initial validity evidence, for each of the 13 countries that collaborated in constructing the Scale.

Career construction theory (Savickas, 2005) conceptualizes human development as driven by adaptation to a social environment with the goal of person–environment integration. The theory takes a contextual and cultural perspective on social adaptation and niche-making. For human beings, adaptation to social life implicates all core and peripheral roles. As they design their lives (Savickas et al., 2009), people must adapt to expectations that they work, play, and develop relationships. The career construction model of adaptation concentrates on only the work role in that it addresses social expectations that individuals prepare for, enter, and participate in the work role and subsequently deal with career transitions between occupational positions. From this perspective, an occupation is a mechanism of social integration or connection, one that offers a strategy for sustaining oneself in society.

1. Adapt

To adapt comes from the Latin meaning *to fit* or *to join*. Over time, subtle distinctions have been made using the root word *adapt* — including adaptivity, adaptability, adapting, and adaptation. In career construction theory (2005), these words denote a sequence ranging across adaptive *readiness*, adaptability *resources*, adapting *responses*, and adaptation *results*. People are more or less prepared to change, differ in their resources to manage change, demonstrate more or less change when change is

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needed, and as a result become more or less integrated into life roles over time. Given the ever-changing nature of individuals and their contexts, a person's adaptivity, adaptability, adapting, and adaptation are in varying states of activation with relative changes in person–environment harmony being the cause and consequence of activation.

1.1. Adaptation

Viewing career construction as a series of attempts to implement a self-concept in work roles concentrates attention on adaptation to a series of transitions from school to work, from job to job, and from occupation to occupation. People construct careers by using adaptive strategies that implement their personalities in work roles. This adaptation is motivated and guided by the goal of bringing inner needs and outer opportunities into harmony, with the harmonics of a good fit amplifying in present activity the individual's past preoccupations and current aspirations. Adaptation, or goodness of fit, is indicated by success, satisfaction, and development.

1.2. Adapting

Adaptation is the consequence of adapting, that is, performing adaptive behaviors that address changing conditions (Ployhart & Bliese, 2006). Career adapting involves mastering vocational development tasks, coping with occupational transitions, and adjusting to work traumas and contingencies. Career construction theory views adapting to these tasks, transitions, and traumas as fostered principally by five sets of behaviors, each named for their adaptive functions: orientation, exploration, establishment, management, and disengagement. These constructive activities form a cycle of adaptive performance that is periodically repeated as the individual must fit into a changing context. As each call for adaptation approaches, individuals can adapt more effectively if they meet changing conditions with growing awareness and information-seeking followed by informed decision making, trial behaviors leading to a stable commitment projected forward for a certain time period, active role management, and eventually forward-looking disengagement. For example, an employee begins a new job with the challenge of adapting to the new work role, including tackling tasks like exploration of the requirements, routines, and rewards of that role. Then she becomes established in the role, manages the role for a certain time period, and eventually disengages from it either voluntarily when further growth readies her to change jobs or involuntarily when organizational changes displace her.

1.3. Adaptivity

In career construction theory, adaptivity is the personality trait of flexibility or willingness to change. The willingness to meet career disequilibrium or transition with fitting responses denotes adaptiveness. The threshold to initiate the interpersonal and intrapersonal processes that guide goal-directed activity is reached when a person can no longer assimilate the changes and persevere in routine activities. At that point, the individual needs to accommodate to the disequilibrium by changing self, context, or both. The required accommodations typically prompt feelings of distress fueling motivation and bolstering the willingness to adapt.

Individuals differ in their willingness or readiness to affect change. Career construction theory views adaptivity or willingness to adapt as an increasingly stable and durable trait or basic tendency that becomes situated at the core of the individual. Adaptiveness is indicated by celerity in the Theory of Work Adjustment, meaning the quickness with which a person responds to disequilibrium (Cheung, 1975; Dawis, 1996). In testing the career construction model of adaptation, this individual-difference variable or trait may be defined with multiple operational indictors, including the *California Psychological Inventory*, the *Proactive Personality Scale*, the *Cognitive Flexibility Inventory*, and Big Five personality items. The *California Psychological Inventory* (Gough, 1996) flexibility scale measures the degree of adaptivity of a person's thinking and social behavior. The *Proactive Personality Scale* (Bateman & Crant, 1993) measures propensity to take action to improve the work environment or find a new one. The *Cognitive Flexibility Inventory* (Dennis & Vander Wal, 2010) measures the tendency to see difficult situations as controllable and to perceive alternatives. From the perspective of the Five-Factor Model of personality, adaptiveness appears to be a compound trait composed of facets from four of the five dimensions. We hypothesize that career adaptivity may be indicated by openness and extroversion (positive) and conscientiousness and agreeableness (negative). We plan to use the International Personality Item Pool (Goldberg, 1999) to construct a measure of career adaptivity. Regardless of how it is operationally defined, the psychological trait of adaptiveness by itself is insufficient to support adaptive behaviors. The individual who is willing to engage in adapting behaviors must bring some resources to bear on changing the situation. Given the goal of adapting to some task, transition, or trauma, there is a need for self-regulation resources.

1.4. Adaptability

Career adaptability is a psychosocial construct that denotes an individual's resources for coping with current and anticipated tasks, transitions, traumas in their occupational roles that, to some degree large or small, alter their social integration (Savickas, 1997). Career adaptability resources are the self-regulation strengths or capacities that a person may draw upon to solve the unfamiliar, complex, and ill-defined problems presented by developmental vocational tasks, occupational transitions, and work traumas. These resources are not at the core of the individual, they reside as the intersection of person-in-environment. Thus adapt-abilities are psycho-social constructs. We agree with Ford's (1994) living systems model in considering adapt-abilities as

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transactional competencies. We view adapt-ability resources as human capital, defined as accumulated competencies and knowledge gained through education and experience (Sullivan & Sheffrin, 2003). Human capital refers to what the person knows. A recent formulation called "psychological capital" or *psychcap* is even closer to our view of adaptability. Luthans, Youssef, and Avolio (2007) defined psychcap as "an individual's positive psychological state of development that is characterized by: (1) having confidence (self-efficacy) to take on and put in the necessary effort to succeed at challenging tasks; (2) making a positive attribution (optimism) about succeeding now and in the future; (3) persevering toward goals and, when necessary, redirecting paths to goals (hope) in order to succeed; and (4) when beset by problems and adversity, sustaining and bouncing back and even beyond (resiliency) to attain success" (p. 3).

Adaptability as psychosocial resources or transactional competencies is more changeable than traits. Adapt-abilities develop through interactions between the inner and outer worlds of the person. They relate strongly to specific roles and contextual contingencies. This means that culture and context place boundary conditions around adaptability. Countries vary in the degree to which they prompt the formation of adaptability because they provide different opportunities and imperatives to develop and express psychosocial resources and transactional competencies.

In career construction theory, adaptability resources help to form the strategies that individuals use to direct their adaptive behaviors. They shape a characteristic style of adapting. Thus the adaptability resources themselves shape self-extension into the social environment because they condition the actual adapting behaviors that constitute the functions of orientation, exploration, establishment, management, and disengagement. In sum, career adaptability resources should be viewed as self-regulatory, psychosocial competencies that shape adaptive strategies and actions aimed at achieving adaptation goals.

1.5. Interplay among adaptiveness, adaptability, adapting, and adaptation

Higher levels of adaptation (outcome) are expected for those who are willing (adaptive) and able (adaptability) to perform behaviors that address changing conditions (adapting). An analogy to airline travel may help readers keep in mind the distinctions between readiness, resources, responses, and results. In preparing for departure, flight attendants ask passengers seated in an exit row whether they are "willing and able" to assist in an emergency. This assistance, should it be needed, requires performance of actions that fit the situation. Passengers are asked about willingness and ability because action in an emergency requires both. Some people may be willing yet unable while other people may be unwilling yet able. In the language of career construction theory, the attendant is asking the passengers whether they have the willingness and resources that may be needed to act in an emergency. Career construction theory views "willing and able" as "adaptivity and adaptability" or as "readiness and resources." To continue the analogy, the airplane emergency might require performance of some life-saving actions. Those that perceive themselves as willing and able may respond by performing the tasks needed to save lives should the situation present itself. This adapting or "doing" involves the behaviors that function to accomplish orientation, exploration, establishment, management, and disengagement. The adapting responses, in turn, lead to some resulting outcome or adaptation, which may be judged by injury or death. In career construction, the outcome is not usually life or death, rather it is goodness of fit or harmony as indicated by development, satisfaction, success, and stability.

Given the derivatives of "adapt," the reader is prepared to consider the construction of an inventory to measure adaptability.

2. Four adapt-ability resources

Self-regulation is based on multiple subsystems and not performed by a single structure. A configuration of resources serves development. Accordingly, career construction theory represents career adaptability resources as an aggregate construct. We presume that resources reflect adaptability, which is therefore a composite of more durable psychological and more labile psychosocial aspects. Furthermore, career adaptability resources are modeled as multi-dimensional and hierarchical. At the second-order level of the hierarchy, the multiple dimensions of the first-order level combine to become a global indicator of adaptability. The lower level consists of a multidimensional matrix of specific attitudes, beliefs, and competencies – the ABCs of career construction – which shape the actual problem-solving strategies and coping behaviors (i.e., adapting) that individuals use to synthesize their vocational self-concepts with work roles. According to career construction theory's model of self-regulation relative to social and developmental tasks, the ABCs in the matrix are grouped into four dimensions of career adaptability resources called *adapt-abilities*: concern, control, curiosity, and confidence. Together, these four syndromes constitute career adaptability resources.

The four adapt-ability syndromes, for short the 4Cs, support self-regulation strategies. *Concern* about the future helps individuals look ahead and prepare for what might come next. *Control* enables individuals to become responsible for shaping themselves and their environments to meet what comes next by using self-discipline, effort, and persistence. Possible selves and alternative scenarios that they might shape are explored when *curiosity* prompts a person to think about self in various situations and roles. These exploration experiences and information-seeking activities produce aspirations and build *confidence* that the person can actualize choices to implement their life design. Thus when vocational tasks, occupational transitions, or work traumas occur, the adaptable individual is conceptualized as (a) becoming *concerned* about the vocational future, (b) taking *control* of trying to prepare for one's vocational future, (c) displaying *curiosity* by exploring possible selves and future scenarios, and (d) strengthening the *confidence* to pursue one's aspirations. Increasing a client's career adaptability resources or career adapt-abilities is a central goal in career education and counseling.

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3. Measurement

An international team of vocational psychologists from 18 countries joined together to craft an operational definition for the linguistic conception of career resources or adapt-abilities (Australia — Mary McMahon; Belgium — Raoul Van Esbroeck and Nicky Dries; Brazil — M. Célia Lassance; China — Zhijin Hou; England — Jenny Bimrose; France — Jean Guichard and Jacques Pouyard; Germany — Barbel Kracke; Hong Kong — Alvin Leung; Iceland — Gugga Vilhjalmsdottir; Italy — Salvatore Soresi, Laura Nota, and Lea Ferrari; Japan — Agnes Watanabe; Korea — Jinkook Tak; Netherlands — Annelies van Vianen and Ute Klehel; Portugal — Maria Eduarda Duarte; South Africa — Kobus Maree and Mark Watson; Switzerland — Jean-Pierre Dauwalder and Jerome Rossier; Taiwan — Hsiu-Lan Tien; USA — Mark Savickas, Erik Porfeli, Fred Leong, Fred Vondracek, and Mark Leach). The team did not want to make a measure in one country, and then translate it for use in other countries. Instead, they wanted to jointly make a measure. The articles in this special issue report some of the work that they have conducted in their individual countries; the remainder of this article reports the work done in a group of 13 countries.

The Career Adaptability Research Team met at Humboldt University (Berlin, Germany) in July, 2008 and at The Royal Melbourne Institute of Technology (Australia) in July 2010 to discuss how to measure the construct of career adaptability. Together, they produced the framework described above as readiness, resources, responses, and results. They settled on the career construction model of adaptability resources to identify and linguistically define what would be called "adapt-abilities." Moreover, they decided to jointly construct a measure of career adapt-abilities in the English language, and then translate it as needed for use in their home countries. The team discussed both qualitative and quantitative methods for assessing adaptability. The members from Australia, England, and South Africa decided to pursue a qualitative approach. Teams from other countries chose to pursue a quantitative approach. This article reports results from the quantitative approach, while another article in this special issue reports initial results from the qualitative approach.

The first step in inventory construction was to discuss cross-cultural similarities and differences and examine indigenous theoretical models. We used the N-way approach (Brett, Tinsley, Janssens, Barsness, & Lytle, 1997) to highlight culture-specific and culture-general conceptions and aspects of adaptability. This work resulted in four linguistic definitions that would lead to operational definitions in terms of items. Concern means the extent to which an individual is oriented to and involved in preparing for the future. Control means the extent of self-discipline as shown by being conscientious and responsible in making decisions. Curiosity means the extent to which an individual explores circumstances and seeks information about opportunities. Confidence means the extent of certitude that one has the ability to solve problems and do what needs to be done to overcome obstacles. These definitions were then used to craft item-generating formulas. Based on these item-generating definitions, scale items were written to operationally define the 4Cs, synonyms for these terms, and closely related processes.

By following the linguistic definitions, a pool of 25 items was written for each of the four variables. We started with a large number of possible items, although we aimed to have in the end subscales composed of only five items each. For three pilot studies in the United States, we used exploratory factor analysis to winnow in half the sets of 25 items. This resulted in four sets of 11 items that we thought best indicated each construct. These 44 items became the research form of the *Career Adapt-Abilities Scale* (CAAS) that was administered to both students and adult workers in 13 countries. This research version of the scale, in English, appears in Appendix 1. We hoped that this large set of 44 items would, in the end, be sufficient to produce a final scale that had five items for each subscale. We chose this target number of items based on the success of the five-item subscales of the *Adult Career Concerns Inventory* (Super, Thompson, & Lindeman, 1988).

Of course, the research form of the CAAS had to be translated from English into the native language of each country. For a few items, a literal translation presented slight difficulties. These difficulties were resolved by group discussion, rather than alone by investigators in a particular country. For example, in Portugal "keeping upbeat" had no meaning. In Iceland, "concerned about my career" could carry a negative emotional component, meaning individuals worry about their career rather than being interested or engaged in thinking about their career. In each of these instances, we attempted to carefully choose words to convey the same or highly-similar meaning. Investigators in each country used back translation to check their work and then piloted the newly-translated scale with small groups of students.

Pilot testing showed problems with the response set, which initially read as follows: 5 = Very much like me; 4 = Like me; 3 = Somewhat like me; 2 = Not like me; and 1 = Definitely not like me. This resulted in poor distribution across five responses. Next we piloted the following response set: 5 = Most Often; 4 = More Often; 3 = More or Less Often; 2 = Less Often; and 1 = Least Often. The results were no better. The third response set piloted was: 5 = Better than almost everyone; 4 = Better than most people; 3 = Like most people; 2 = Better than some people; and 1 = Better than few people. This response set showed slight improvement yet it still was deemed unsatisfactory. Finally, a pilot test of the fourth response set showed good results: 5 = Strongest; 4 = Very Strong, 3 = Strong; 2 = Somewhat strong; and 1 = Not strong. The final instructions for the international research form of the scale read: "Some people use different strengths to build their careers. No one is good at everything, each of us emphasizes some strengths more than others. Please rate how strongly you have developed each of the following abilities using the scale below."

Then data was collected in 13 countries: Belgium, Brazil, China, France, Iceland, Italy, Korea, the Netherlands, Portugal, South Africa, Switzerland, Taiwan, and the United States. The next step was to assemble the resulting data into one large data set in order to examine the psychometric characteristics of the Career Adapt-Abilities Scale — Research Form (CAAS 1.0). Before addressing the traditional psychometric issues of reliability and construct validity, we examined its factor structure. We expected a factor structure to be multidimensional and hierarchical, coinciding with our theoretical model of

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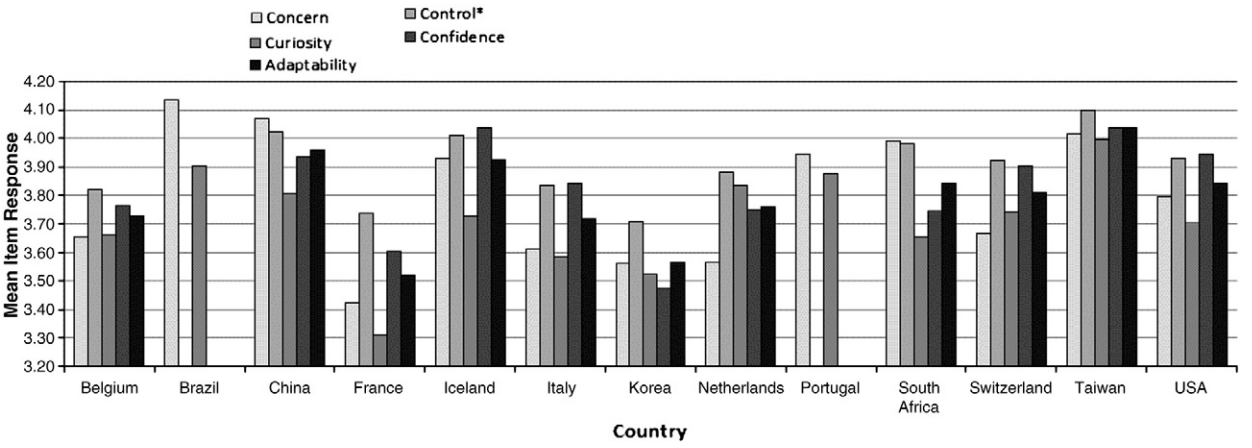

Fig. 1. CAAS means by countries.

adaptability. We tested this expectation using hierarchical, confirmatory factor analysis (Fig. 2). Assuming the data fits the multi-dimensional, hierarchical model, we then moved to examine the measurement equivalence and reliability of the CAAS across countries.

Given that we developed the CAAS in multiple countries, we needed to determine whether respondents from different countries and cultures interpret the CAAS in a conceptually similar manner. Vandenberg and Lance (2000) explained that measurement equivalence or invariance is important in constructing a scale intended to test substantive hypotheses across countries. They warned that "violations of measurement equivalence assumptions are as threatening to substantive interpretations as is an inability to demonstrate reliability and validity" (p. 6).

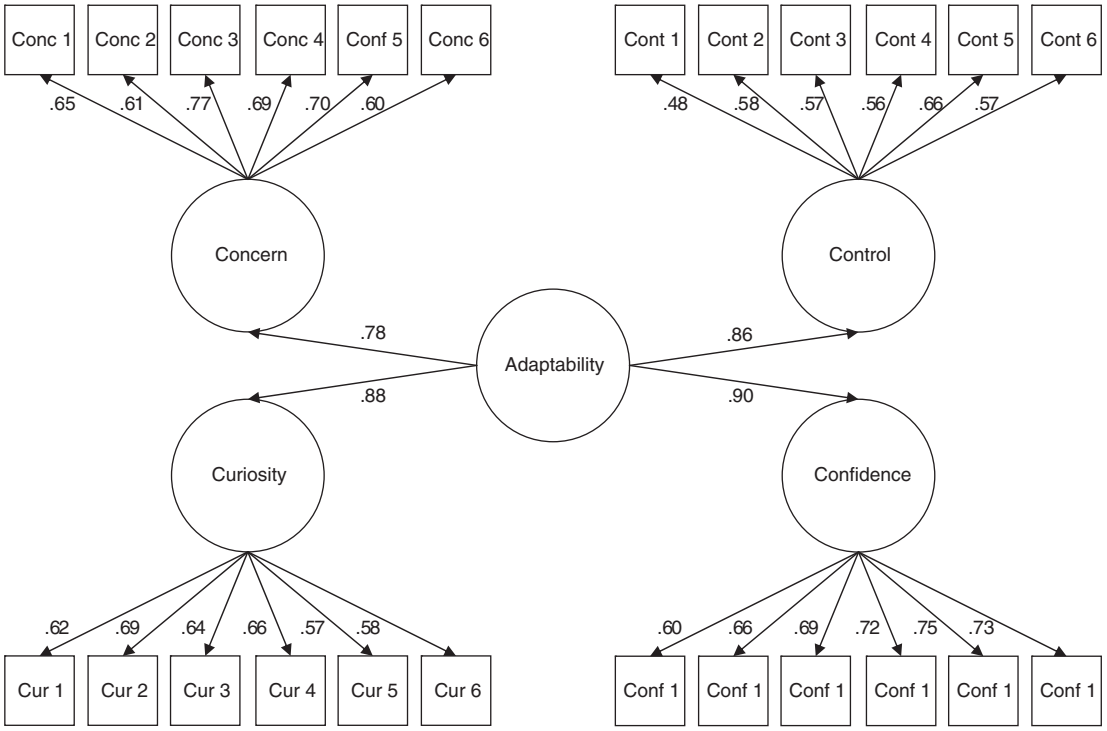

Fig. 2. Hierarchical confirmatory factor model.

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We examined measurement invariance in four ways, with each way imposing increasingly stringent requirements on the measurement model. First, we examined configural invariance to explore the basic structure of the construct "adapt-abilities" cross-nationally and determine if the same items load on the same factors across the different countries. Second, we examined the structural relationships among the construct. This more stringent form of measurement equivalence is called metric invariance, and means that the factor loadings associated with items are equivalent across countries. Third, we examined residual invariance to determine whether the unexplained variance is equivalent across countries. For the CAAS, we expected configural, metric, and residual invariances. We did not expect scalar invariance. This fourth form of measurement equivalence means that, in addition to the metric and residual invariances, the item intercepts or means are equivalent across countries. We did not expect scalar invariance because adapt-abilities are psychosocial variables, not purely psychological traits independent from context.

Previous reviews of the CFA invariance literature have emphasized the role of theory in guiding the use of tests of means invariance across groups (Ployhart & Oswald, 2004; Vandenberg & Lance, 2000). In cases where theory suggests that groups should exhibit mean differences at the item and construct levels, scalar invariance may not be a reasonable hypothesis. For example, a measure of masculinity may be predicted to exhibit mean differences across males and females; hence, a failure of a test of scalar invariance would be used to affirm the predicted sex difference in the gender measure and support underlying gender theory as it pertains to predicted sex differences. Psychosocial constructs, such as adaptability, are highly sensitive to context and age. Different ecological niches, economies, countries, and cultures offer different demands for and opportunities to develop adapt-abilities. So, context likely has an appreciable effect on people's expression of this construct. If this understanding is accurate, then scalar invariance would be an unreasonable expectation. On the contrary, any mean differences may be attributed, at least in part, to scale differences across countries to the extent that citizens from different countries perceive the items and response set differentially as a consequence of, for example, cultural or linguistic differences. Expressed country-level mean differences may, therefore, be the product of country-level factors affecting the citizenry's capacity to be adaptable, differences in scale associated with measurement limitations, or a combination of both. While the present study does not include the data to disentangle true differences from scale differences across countries, we expect that meaningful true differences may exist. As a consequence, we predict that the CAAS will not exhibit scalar invariance.

3.1. Analytic procedures

We assessed the psychometric properties, including factor structure and internal consistency reliability, of the CAAS across multiple samples representing 13 countries. All observed items were assessed for normality in accordance with assumptions of confirmatory factor analytic (CFA) framework. We assessed the factor model and its invariance across countries using mean and covariance structure (MACS) analysis (Ployhart & Oswald, 2004). This approach extends the traditional covariance structure analysis within a CFA framework to include an analysis of the latent mean structure of the CFA model. The MACS analysis approach has several advantages over traditional CFA approaches in that it (a) accounts for measurement error variances when estimating construct (latent) means, (b) avoids possible violations of the homogeneity of variances within ANOVA given that MACS analysis does not require this assumptions, (c) tests factor loading and item intercept invariance before testing the structural model, and (d) provides a systematic means of accounting for partial invariance in the measurement model.

The MACS analysis was conducted in multiple steps, which are outlined in Tables 2–4. Model 0 (or M0) tested for the viability of the measurement model within each country and allowed for an assessment of configural invariance. M1 assessed the baseline fit of the measurement model across countries. In the case of this study, countries varied greatly in the size of their sample and a few countries did not submit complete data; hence multiple M1 models were computed to assess the potential bias in favor of countries who contributed more participants. M2 assessed the metric invariance of the measurement model relative to the M1 baseline model. M3 tested for equivalence of the error variances (i.e., strict invariance) relative to the fit of the M2 metric invariance model. The M3 models included tests of partial error invariance in light of the full error invariance model failing. M4 established the baseline for testing the equivalence of the latent means. This model included a test of the level 2 latent means (M4a; concern, control, curiosity, and confidence) by holding invariant the observed item intercepts (i.e., level 1) and the level 3 latent means (e.g., adaptability) and a test of the level 3 means by holding invariant the observed item intercepts (i.e., level 1) and the level 2 latent means. M5 tests the invariance of the level 2 and 3 construct variances. Finally, M6 tested the invariance of the means and the variances. All tests of invariance employed established ΔCFI (>-0.01) and ΔRMSEA (<0.05) criteria (Cheung & Rensvold, 2002).

It should be noted, that more detailed within-country analyses were conducted employing the same data used to conduct the analyses reported in this paper. The reader is referred to the remaining articles in this special issue for the more detailed country-specific analyses and results.

4. Results

Initial analyses reduced the 11 items on each subscale to 6 items for each of the four subscales — concern, control, curiosity, and confidence. The following results detail analyses of these 24 items.

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In analyzing the data for the four subscales of concern, control, curiosity and confidence, we excluded multivariate outliers using Mahalanobis estimates, which translated into excluding 5.51% of the participants from all the subsequent analyses. Table 1 presents the final items for each scale and their internal consistency reliabilities. Univariate statistics (e.g., means, standard deviations, skewness, and kurtosis) were computed for all the observed indicator items from the CAAS. These results suggest that all of the items conformed to normality assumptions associated with correlation-based statistics (i.e., skewness and kurtosis values with ± 1) across countries and generally within countries. Within countries the maximum skewness value was -1.38 and maximum kurtosis value was 3.08. The skewness values within countries were generally more aligned with assumptions than the kurtosis values, which is favorable in light of correlation-based statistics being more robust to violations of kurtosis. It should be stated here that Taiwan employed a response set ranging from 1 to 6 and all other countries employed a response set ranging from 1 to 5. The Taiwan data was transformed to conform to the 1 to 5 range to limit the inflate item means that the difference in scale could have for Taiwan. The data from Taiwan also had the most consistent violations of the skewness and kurtosis assumptions with 5 items exhibiting skewness values between -1 and -1.38 and 17 items with kurtosis values between 1 and 3.08 and 3 of those items exhibited kurtosis values between 2 and 3.08. The response set in combination with these distributions suggests that the data are generally quite consistent with the assumptions of correlation-based statistics. The results also call attention to the distributions of the Taiwan data as being potentially problematic and reflecting a tendency in these participants to score items consistently higher than participants in other countries.

The correlations for all the observed indicator items from the CAAS were computed (not tabled). The pattern of correlations suggested that the within-factor item correlations were typically within the range of $r = .3$ to .6 and were generally higher than the between-factor correlations with correlations typically in the range of $r = .2$ to .4. This pattern of relationships supports the presumed four-factor structure of the level-one constructs. The magnitude of the between-factor item correlations suggested that the four factors may, in turn, combine to become a higher-order global adaptability factor.

Table 2 contains the results from the MACS analysis for M0 to M1 models. These results largely confirm the configural invariance of the measurement model across all countries. While all countries exhibited acceptable model fit (M0 Models), the samples from Iceland and the Netherlands generally exhibited the poorest model fit across the three fit indices while the samples from South Africa and the USA exhibited the best fit. The M1 models demonstrate that the model fit does not appreciably change on the basis of using all data to include partial data provided by Brazil and Portugal (i.e., they used only four items for the control and for the confidence scales) and/or only an equal subset of participants randomly drawn from each country. To avoid potential

Table 1
Career Adapt-Abilities Scale: items, standardized loadings for the final M1 model, standard deviations of the loadings across the M1 models, and internal consistency reliabilities.

Construct		Item (First-order indicators)	Loading[a]	*SD*	α	Min α	Max α
Concern	1.	Thinking about what my future will be like	0.65	0.01	0.83	0.76	0.90
	2.	Realizing that today's choices shape my future	0.61	0.01			
	3.	Preparing for the future	0.77	0.00			
	4.	Becoming aware of the educational and career choices that I must make	0.69	0.01			
	5.	Planning how to achieve my goals	0.70	0.01			
	6.	Concerned about my career	0.60	0.02			
Control	1.	Keeping upbeat	0.48	0.01	0.74	0.65	0.89
	2.	Making decisions by myself	0.58	0.02			
	3.	Taking responsibility for my actions	0.57	0.01			
	4.	Sticking up for my beliefs	0.56	0.02			
	5.	Counting on myself	0.66	0.01			
	6.	Doing what's right for me	0.57	0.01			
Curiosity	1.	Exploring my surroundings	0.62	0.01	0.79	0.70	0.89
	2.	Looking for opportunities to grow as a person	0.69	0.01			
	3.	Investigating options before making a choice	0.64	0.01			
	4.	Observing different ways of doing things	0.66	0.02			
	5.	Probing deeply into questions I have	0.57	0.02			
	6.	Becoming curious about new opportunities	0.58	0.00			
Confidence	1.	Performing tasks efficiently	0.60	0.01	0.85	0.76	0.91
	2.	Taking care to do things well	0.66	0.01			
	3.	Learning new skills	0.69	0.01			
	4.	Working up to my ability	0.72	0.01			
	5.	Overcoming obstacles	0.75	0.01			
	6.	Solving problems	0.73	0.01			
Construct		Construct (Second-order indicators)	Loading	*SD*	α	Min α	Max α
Adaptability	1.	Concern	0.78	0.01	0.92	0.87	0.96
	2.	Control	0.86	0.01			
	3.	Curiosity	0.88	0.02			
	4.	Confidence	0.90	0.01			

[a] All of the loadings are statistically significant at $\alpha = 0.01$.

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Table 2
Mean and covariance structure analysis: M0 to M1.

	Model	χ^{2*}	*df*	CFI	RMSEA	SRMR
$M0_{Belgium}$	Belgium Measurement Model	501.9	248	0.90	0.053	0.057
$M0_{China}$	China Measurement Model	530.8	248	0.86	0.064	0.057
$M0_{France}$	France Measurement Model	740.1	248	0.86	0.056	0.054
$M0_{Iceland}$	Iceland Measurement Model	2372.4	248	0.87	0.073	0.062
$M0_{Italy}$	Italy Measurement Model	898.4	248	0.89	0.058	0.049
$M0_{Korea}$	Korea Measurement Model	577.2	248	0.89	0.067	0.060
$M0_{Netherlands}$	Netherlands Measurement Model	744.4	248	0.85	0.068	0.070
$M0_{South\ Africa}$	South Africa Measurement Model	438.0	248	0.92	0.046	0.048
$M0_{Switzerland}$	Switzerland Measurement Model	692.3	248	0.88	0.071	0.056
$M0_{Taiwan}$	Taiwan Measurement Model	910.0	248	0.92	0.078	0.049
$M0_{USA}$	USA Measurement Model	556.6	248	0.94	0.052	0.040
M1a	Combined group — All data[a]	4987.1	248	0.93	0.050	–
M1b	Combined group — All data absent Brazil and Portugal[b]	4454.1	248	0.92	0.053	0.039
M1c	Combined group — Random selection[c]	2318.5	248	0.93	0.048	–
M1d	Combined group — Random selection absent Brazil and Portugal[d]	2098.8	248	0.93	0.049	0.037

All $\Delta\chi^2$ values are statistically significant at $\alpha = 0.01$.
* $p < .001$.
[a] Includes all data from all countries.
[b] Includes all data from all countries absent Brazil and Portugal.
[c] Includes a random selection of 278 participants from each country.
[d] Includes a random selection of 278 participants from each country absent Brazil and Portugal.

undetected problems with disproportionate sample sizes across countries, all subsequent analyses were conducted with equivalent subsamples from each country. The standardized loadings for the final model along are reported in Table 1. All of the loadings are statistically significant at $\alpha = 0.01$.

The final M1 through M3 models were tested with the samples from all the countries minus Brazil and Portugal because they did not employ all of 24 items from the CAAS and SRMR estimates cannot be computed with incomplete data. These results (see Table 3) demonstrated metric equivalence in the CAAS hierarchical measurement model, but residual (strict) invariance was not achieved. Modification indices were examined for the residual invariance model and error terms with problematic modification indices were freed in an attempt to achieve partial residual invariance (M3b–M3f). While partial invariance was achieved, this process also revealed that both France and Taiwan exhibited consistent misfit with this model. The error variances for the sample from Taiwan were much lower (i.e., extraordinary better fit, mean error variance = 0.18) than the norm (mean error variance = 0.38) and were much higher for the sample from France (i.e., extraordinary poorer fit; mean error variance = 0.51). The sample from France demonstrated 17 modification indices greater than zero with a modification index sum of 482.9 and the sample from Taiwan demonstrated 24 indices greater than zero with a sum of 797.5. The next most problematic sample was from the USA with 5 modification indices summing to 207.5 and a mean error variance of (0.41). The error term associated with concern item #6 accounted for 162.7 of this sum and was the most problematic error

Table 3
Mean and covariance structure analysis: M1 to M3 models excluding Brazil and Portugal.

	Model[a]	χ^{2b}	*df*	CFI	RMSEA	SRMR	$\Delta\chi^2$ (Δ *df*)[b]	ΔCFI	ΔRMSEA
M1.	Unconstrained	5704.6	2728	0.89	0.190	0.060			
M2a.	Measurement weight equivalence level 1	6046.0	2928	0.89	0.190	0.063	341.4 (200)	−0.005[c]	0.000[c]
M2b.	Measurement weight equivalence levels 1 and 2	6090.7	2958	0.89	0.190	0.064	386.1 (230)	−0.006[c]	0.000[c]
M3a.	Measurement residual equivalence level 1	8962.6	3198	0.79	0.024	0.066	2871.9 (240)	−0.095	0.005[c]
M3b.	Measurement residual equivalence level 1 freeing errors 6, 20, 21*	8433.9	3168	0.81	0.023	0.064	2343.2 (210)	−0.077	0.004[c]
M3c.	Measurement residual equivalence level 1 freeing errors 2, 6, 7, 9, 11, 12, 13, 18, 20, 21, 23, and 24*	7295.2	3088	0.85	0.021	0.064	1204.5 (130)	−0.039	0.002[c]
M3d.	Measurement residual equivalence levels 1 and 2	9229.4	3238	0.78	0.025	0.066	3138.7 (280)	−0.103	0.006[c]
M3e.	Measurement residual equivalence levels 1 and 2 freeing level 1 errors 2, 6, 7, 9, 11, 13, 18, 20, 21, 23, and 24*	7486.6	3128	0.84	0.021	0.064	1395.9 (170)	−0.044	0.002[c]
M3f.	Measurement residual equivalence levels 1 and 2 freeing level 1 errors 2, 6, 7, 9, 11, 13, 18, 20, 21, 23, and 28*	7418.7	3118	0.84	0.021	0.064	1328 (160)	−0.042	0.002[c]

* Error identification numbers are aligned with the sequence of the measure contained in Table 1. Error # 28 is associated with the confidence factor.
[a] Includes a random selection of 278 participants from each country absent Brazil and Portugal.
[b] All χ^2 and $\Delta\chi^2$ values are statistically significant at $\alpha = 0.01$.
[c] ΔCFI > −0.01 and ΔRMSEA < 0.05 as suggested by Cheung and Rensvold (2002).

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Table 4
Mean and covariance structure analysis: M1 to M6 models excluding Brazil, Portugal, France and Taiwan.

	Model[a]	χ^2	*df*	CFI	RMSEA	SRMR	$\Delta\chi^2$ (Δ *df*)	ΔCFI	ΔRMSEA
M1.	Unconstrained	4533.1	2232	0.89	0.020	0.061			
M2a.	Measurement weight equivalence level 1	4831.1	2392	0.89	0.020	0.063	298 (160)	−0.006[b]	0.000[b]
M2b.	Measurement weight equivalence levels 1 and 2	4858.0	2416	0.89	0.020	0.064	324.9 (184)	−0.006[b]	0.000[b]
M3a.	Measurement residual equivalence level 1	5871.8	2608	0.85	0.022	0.067	1013.8 (192)	−0.039	0.002[b]
M3b.	Measurement residual equivalence level 1 freeing errors 6, 21*	5594.1	2592	0.86	0.022	0.066	736.1 (176)	−0.027	0.002[b]
M3c.	Measurement residual equivalence level 1 freeing errors 2, 3, 6, 7, 9, 11, 12, 14, 18, 20, 21, 23, and 24*	5072.0	2504	0.88	0.020	0.064	214 (88)	−0.006[b]	0.000[b]
M3d.	Measurement residual equivalence levels 1 and 2	6015.6	2640	0.84	0.023	0.068	1157.6 (224)	−0.044	0.003[b]
M3e.	Measurement residual equivalence levels 1 and 2 freeing level 1 errors 2, 3, 6, 7, 9, 11, 12, 14, 18, 20, 21, 23, and 24*	5218.7	2536	0.87	0.021	0.065	360.7 (120)	−0.012	0.001[b]
M3f.	Measurement residual equivalence levels 1 and 2 freeing level 1 errors 2, 3, 6, 7, 9, 11, 12, 14, 18, 20, 21, 23, 24 and 28*	5151.5	2528	0.88	0.020	0.065	293.5 (112)	−0.009[b]	0.000[b]
M4a.	Levels 1 and 3 means equivalence and 3f	7255.4	2688	0.79	0.026	0.065	2103.9 (160)	−0.091	0.006[b]
M4b.	Levels 1 and 2 means equivalence and 3f	7593.9	2712	0.77	0.027	0.065	2442.5 (184)	−0.106	0.007[b]
M5.	Level 3 variance equivalence and 3f	7788.2	2736	0.76	0.027	0.086	194.2 (24)	−0.008[b]	0.000[b]
M6.	Levels 1, 2, and 3 means equivalence and 3f	7917.0	2744	0.76	0.027	0.094	128.9 (8)	−0.005[b]	0.000[b]

All χ^2 and $\Delta\chi^2$ values are statistically significant at $\alpha = 0.01$.
* Error identification numbers are aligned with the sequence of the measure contained in Table 1. Error # 28 is associated with the confidence factor.
[a] Includes a random selection of 278 participants from each country absent Brazil, Portugal, France and Taiwan.
[b] ΔCFI > −0.01 and ΔRMSEA <0.05 as suggested by Cheung and Rensvold (2002).

term across the countries. These results suggest that the CAAS exhibits metric invariance across all the countries examined, demonstrates that Taiwan exhibits better that average fit to the residual invariance model, France exhibits poorer than average fit to the residual invariance model, and concern item #6 appears to be the most problematic item to establishing error invariance across the samples.

These results supported re-estimating the models absent the samples from France and Taiwan (see Table 4) and at least freeing the error term associated with concern item #6. All of the results from M1 to M2 generally remained the same and the results for M3 improved, but the models continued to demonstrate that residual invariance was not achieved. M3b to M3f demonstrate progressive attempts to achieve partial residual invariance. This process led to 14 of the 28 residuals needing to be freed in order to conform with established criteria (i.e., ΔCFI > −0.01 and ΔRMSEA <0.05; (Cheung & Rensvold, 2002)). This approach depends greatly on the data employed in the study and, as such, results should be treated with caution. It should also be noted that no single country demonstrated consistent misfit to the residual invariance model as France and Taiwan had in the previous set of CFA models in Table 3. The remaining models in Table 4 demonstrate that the CAAS does not achieve scalar invariance across countries, which coincides with our prediction for adaptability as a psychosocial construct. The results, in totality, suggest that the CAAS is metric invariant across countries.

The univariate statistics were computed for the five constructs of the CAAS and reported in Table 5. With the exception of Taiwan, all other country samples exhibited univariate results that conform to correlation-based assumptions pertaining to normality. The maximum kurtosis values reported in Table 5 all source from the Taiwan data. No other country exhibited kurtosis values outside the range of ±1. The internal consistency reliabilities (Cronbach's α) for the scales were computed across and within countries and reported in Table 1. With the exception of the control scale, the range of the reliability estimates suggests that all of the measures fall within the acceptable to excellent range. The reliability of the control scale is the most problematic with the samples from China and France exhibiting alphas below 0.70. Across all the countries, the samples from Taiwan and France respectively exhibited the highest and lowest reliability estimates across all the CAAS constructs, but the reliability of the third-order adaptability construct was in the upper acceptable range for France ($\alpha = 0.87$).

Table 5
Means and standard deviations of the CAAS constructs across countries.

Item	Mean	Min mean	Max mean	*SD*	Min *SD*	Max *SD*	Skewness	Min skewness	Max skewness	Kurtosis	Min kurtosis	Max kurtosis
Concern	3.82	3.42	4.14	0.68	0.52	0.76	−0.44	−0.81	0.04	−0.05	−0.52	1.24
Control	3.92	3.71	4.10	0.59	0.50	0.67	−0.49	−1.05	−0.18	0.29	−0.60	2.69
Curiosity	3.73	3.31	4.00	0.63	0.50	0.70	−0.25	−0.73	0.12	−0.04	−0.58	1.68
Confidence	3.87	3.47	4.04	0.63	0.48	0.71	−0.27	−0.89	0.07	−0.01	−0.58	2.33
Adaptability	3.81	3.52	4.04	0.53	0.42	0.59	−0.27	−0.97	0.09	0.24	−0.51	2.76

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Fig. 1 depicts the means for the CAAS across countries. These results were computed with all the data contributed by the partnering countries rather than the random subsample. Any test and interpretation of the mean differences across countries must be done with caution in light of the possibility that the mean differences may be at least partially due to scalar differences. The ANOVA models for concern ($F(12, 7571) = 68.87$, $p < .001$, $\eta 2 = 0.10$), control ($F(1, 5953) = 22.35$, $p < .001$, $\eta 2 = 0.04$), curiosity ($F(12, 7571) = 49.16$, $p < .001$, $\eta 2 = 0.07$), confidence ($F(1, 5953) = 44.83$, $p < .001$, $\eta 2 = 0.07$), and adaptability ($F(1, 5953) = 50.24$, $p < .001$, $\eta 2 = 0.08$) demonstrated that the mean differences ranged from small to moderate based on eta-squared values. France and Korea exhibited the lowest and Taiwan, China, and Brazil exhibited highest means. France and Taiwan demonstrating the lowest and highest means are interesting in light of them also showing the greatest misfit with the residual equivalence models.

5. Discussion

Several years work by a team of collaborators from 13 countries has produced an international measure of career adaptability called the Career Adapt-Abilities Scale (CAAS). The CAAS demonstrated metric invariance in that the scale items showed similar relations among the latent traits across countries. Thus the results suggest that the CAAS measures the same constructs in the same way across countries. It also had acceptable but varied reliability across all the countries. The CAAS did not, however exhibit residual/strict invariance. Strict invariance requires an equality of the residuals of the indicators across countries. It shows whether the random error variances of the observed items are equal across groups. This test of the measurement precision is not required to conclude that the constructs are measured equivalently across groups (Selig, Card, & Little, 2008). The CAAS did not exhibit scalar invariance in that the subscale means, as expected, were not equal across countries. A rigorous, multi-step examination ruled out potential threats to the accuracy of our results concerning measurement equivalence on the basis of disproportion representation of certain countries with more participants.

The univariate statistics of the CAAS constructs generally conform to correlation-based assumptions of normality. The reliabilities of the CAAS subscales and the combined adaptability scale range from acceptable to excellent when computed with the combined data. As expected, the reliability estimates varied across countries. Nevertheless, the internal consistency estimates for the four subscales of concern, control, curiosity, and confidence were generally acceptable to excellent. The internal consistency estimates for the total score for the CAAS ranged from good to excellent across all the countries. There was some variability in the country-level psychometrics with France exhibiting the poorest reliability indicators. Nevertheless, even for France, the characteristics look promising and particularly so for the adaptability total score.

The data from each country adequately fit the theoretically-derived measurement model based on the established criteria of RMSEA and SRMR fit indices for the unconstrained model with unequal N. While the fit indices were acceptable for each country, there was variation among countries. The three countries with the best fit to the model were the USA, South Africa, and Italy. Thus, the theoretically derived measurement model of the CAAS worked best in these countries. The three countries with the poorest fit to the model were the Netherlands, Iceland, and Korea. Despite having the poorest fit, the fit of data to the model for those countries was adequate and acceptable.

With regard to reliability, Taiwan exhibited the strongest internal consistency estimates. Taiwan employed an item response set from 1 to 6 that was transformed to 1 to 5. The Taiwanese sample also exhibited the highest means despite the transformation as well as extraordinary good fit to the residual invariance model. The three countries with the lowest reliability estimates were France, Belgium, and the Netherlands. The sample from France exhibited the lowest reliability estimates, and this was confirmed by worst fit to the residual invariance model.

Taiwan, China, and Iceland had the highest means while France, Korea, and Italy had the lowest means. The differences in mean scores, or in other words the lack of scalar invariance, were expected because the subscales measure context-sensitive, psychosocial capital. We cannot interpret the meaningfulness of the differences in scores because we do not know what part is measurement artifact and which part reflects true differences. Further study is needed to identify theoretical predictors of the mean differences between economies, cultures, and countries to determine the extent to which they explain the observed differences across countries.

Overall, we conclude that the CAAS that appears in Appendix 2 is ready for further testing and development, especially elaboration of career adaptability's nomological network and validity evidence for CAAS scores. The measure appears to have strong potential to be useful in the internationalization of career development research and intervention in the global economy of the 21st century.

Separate articles in this special issue report the psychometric characteristics of the CAAS, including initial validity evidence, for each of the 13 countries that collaborated in constructing the Scale. The precise numbers reported for means and reliabilities may vary slightly from those reported herein. For the present article, we removed multivariate outliers. Because we did not have the other data used in the following articles, we could not easily inform the authors about which outliers to remove from their complete data set. As reported in their separate articles, the authors made various decisions about how to treat outliers. While some numerical values may vary between their article and this article, the numbers are accurate to the best of our knowledge.

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Appendix 1. Career Adapt-Abilities Inventory — Version 1.0

Career Adapt-Abilities Inventory 1.0

Age _____ Circle one: Male or Female

Different people use different strength to build their careers. No one is good at everything, each of us emphasizes some strengths more than others. Please rate how strongly you have developed each of the following abilities using the scale below.

5 = Strongest
4 = Very Strong
3 = Strong
2 = Somewhat strong
1 = Not strong

STRENGTHS	5	4	3	2	1
Planning important things before I start	___	___	___	___	___
Thinking about what my future will be like	___	___	___	___	___
Realizing that today's choices shape my future	___	___	___	___	___
Expecting the future to be good	___	___	___	___	___
Preparing for the future	___	___	___	___	___
Becoming aware of the educational and vocational choices that I must make	___	___	___	___	___
Planning how to achieve my goals	___	___	___	___	___
Keeping upbeat	___	___	___	___	___
Considering the consequences of my decisions	___	___	___	___	___
Anticipating changes I must make	___	___	___	___	___
Concerned about my career	___	___	___	___	___
Making decisions by myself	___	___	___	___	___
Thinking before I act	___	___	___	___	___
Taking responsibility for my actions	___	___	___	___	___
Being persist and patient	___	___	___	___	___
Sticking up for my beliefs	___	___	___	___	___
Counting on myself	___	___	___	___	___
Directing my future	___	___	___	___	___
Learning how to make better decisions	___	___	___	___	___
Doing what's right for me	___	___	___	___	___
Doing what's best for my family	___	___	___	___	___
Taking charge of my future	___	___	___	___	___
Finding the strength to keep going	___	___	___	___	___
Exploring my surroundings	___	___	___	___	___
Looking for opportunities to grow as a person	___	___	___	___	___
Imagining what my future will be like	___	___	___	___	___
Investigating options before making a choice	___	___	___	___	___
Observing different ways of doing things	___	___	___	___	___
Probing deeply into questions I have	___	___	___	___	___
Searching for information about choices that I must make	___	___	___	___	___
Becoming curious about new opportunities	___	___	___	___	___
Considering my alternatives	___	___	___	___	___
Seeking feedback about my plans	___	___	___	___	___
Questioning myself	___	___	___	___	___
Performing tasks efficiently	___	___	___	___	___
Learning from my mistakes	___	___	___	___	___
Being dependable—doing what I say I will do	___	___	___	___	___
Feeling pride in a job well done	___	___	___	___	___
Having self-confidence	___	___	___	___	___
Taking care to do things well	___	___	___	___	___
Learning new skills	___	___	___	___	___
Working up to my ability	___	___	___	___	___
Overcoming obstacles	___	___	___	___	___
Solving problems	___	___	___	___	___
Doing challenging things	___	___	___	___	___

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Appendix 2. Career Adapt-Abilities Inventory — International Version 2.0

Name _____ Age _____ Circle one: Male or Female

Different people use different strength to build their careers. No one is good at everything, each of us emphasizes some strengths more than others. Please rate how strongly you have developed each of the following abilities using the scale below.

5 = Strongest
4 = Very Strong
3 = Strong
2 = Somewhat strong
1 = Not strong

STRENGTHS	**5**	**4**	**3**	**2**	**1**
Thinking about what my future will be like	___	___	___	___	___
Realizing that today's choices shape my future	___	___	___	___	___
Preparing for the future	___	___	___	___	___
Becoming aware of the educational and vocational choices that I must make	___	___	___	___	___
Planning how to achieve my goals	___	___	___	___	___
Concerned about my career	___	___	___	___	___
Keeping upbeat	___	___	___	___	___
Making decisions by myself	___	___	___	___	___
Taking responsibility for my actions	___	___	___	___	___
Sticking up for my beliefs	___	___	___	___	___
Counting on myself	___	___	___	___	___
Doing what's right for me	___	___	___	___	___
Exploring my surroundings	___	___	___	___	___
Looking for opportunities to grow as a person	___	___	___	___	___
Investigating options before making a choice	___	___	___	___	___
Observing different ways of doing things	___	___	___	___	___
Probing deeply into questions I have	___	___	___	___	___
Becoming curious about new opportunities	___	___	___	___	___
Performing tasks efficiently	___	___	___	___	___
Taking care to do things well	___	___	___	___	___
Learning new skills	___	___	___	___	___
Working up to my ability	___	___	___	___	___
Overcoming obstacles	___	___	___	___	___
Solving problems	___	___	___	___	___

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