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Education for people and planet: Creating sustainable futures for all

Non-cognitive skills: Definitions, measurement and malleability

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Definition of Non-Cognitive Skills

Skills are widely considered as key elements contributing to the sustainable development of nations and the well-being of individuals. From an economic perspective, skill is a form of human capital that produces value and impacts the distribution of income. In sociology, skill is evaluated by the extent of complexity of the task which requires that particular skill (Attewell, 1990) and it is always related to learning input and value (Green, 2011). Psychology's view of skills is focused on the generation and function of competency: whether one can do some tasks. Green (2011) takes all these aspects into account and defines skill as a personal quality that meets three criteria: 1) socially determined, 2) capable of producing value and 3) improvable by training and development.

Commonly, skills are divided into cognitive and non-cognitive. According to Pierre et al. (2014), cognitive skills involve the "ability to understand complex ideas, to adapt effectively to the environment, to learn from experience, to engage in various forms of reasoning, to overcome obstacles by taking thought." They include mental abilities that are used in thinking activities including reading, writing, and numeracy. (Green, 2010). Non-cognitive skills are defined as the "patterns of thought, feelings and behaviours" (Borghans et al., 2008) that are socially determined and can be developed throughout the lifetime to produce value. Non-cognitive skills comprise personal traits, attitudes and motivations.

For the purpose of this review, we focus on non-cognitive skills for which there is evidence that, first, they have a positive effect on employment outcomes and, second, education and training can have a significant impact on the development of these skills.

Many studies use the "Big Five" personality assessment test to measure non-cognitive skills. For example, the World Bank Skill towards Employment and Productivity (STEP) survey includes this test as a part of its measurement of socio-emotional skills. However, research suggests that, while the Big Five personality traits may have strong predictive power in explaining performance in the labour market, they are relatively stable over the lifecycle and largely impacted by the culture.

A longitudinal study of twins reveals that 80 percent of personality stability was attributed to genetic factors. Only permanent and consistent changes in environment such as parenthood might budge personality (McGue, Bacon and Lykken, 1993). The heritability of the Big Five traits has been demonstrated across different countries (e.g., Jang et al., 2006). Jang, Livesley, and Vernon (1996) studied the five personalities using 12 pairs of identical twins and 127 pairs of fraternal twins. The results revealed that the influence on neuroticism, extraversion, openness, agreeableness, and conscientiousness from heritability was estimated at 41%, 53%, 61%, 41% and 44% respectively.

Research also indicates that culture is the key environmental determinant of a person's personality (e.g., Church, 2000; Triandis and Suh, 2002). For example, Schmitt et al., (2007) studied the Big Five traits across 56 nations and found people from South America and East Asia reported differently in openness from people in other regions. Consequently, we suggest not including the big five personality traits in the non-cognitive skill measurement because it's not easily improved by training or education.

Gutman and Schoon (2013) identified eight non-cognitive skills: self-perception of ability, motivation, perseverance, self-control, metacognitive strategies, social competencies, resilience and coping, as well as creativity. Positive associations between each of these eight non-cognitive skills and academic achievement have been demonstrated in some social studies. But operational definitions are not clear

for self-perception of ability, motivation, metacognitive strategies, resilience and coping as well as creativity. And there is little consistency among researchers about how to measure these five skills. Research on their malleability through training and intervention or global generalizability is limited. Thus, in the literature review, we focus on three non-cognitive skills—perseverance/grit, self-control, and social skills.

Perseverance/Grit

The U.S. Department of Education defined grit as “perseverance to accomplish long-term or higher-order goals in the face of challenges and setbacks, engaging the student’s psychological resources, such as their academic mind sets, effortful control, and strategies and tactics” (Shechtman et al., 2013, p.15). Researchers consistently adopt as a measurement tool the Grit Scale which contains 12 self-reported items (8 items for children version) on two facets--consistency of interest and perseverance of effort (Duckworth and Quinn, 2009; see Appendix A).

Perseverance or grit is found to be a strong predictor for the grade point average (GPA) score of college students (e.g., Duckworth et al., 2007; Strayhorn, 2014), retention in the United States Military Academy (Duckworth et al., 2007), performance of first year military cadets at West Point Academy (Maddi et al., 2012), education attainment (Duckworth et al., 2007), rankings in the National Spelling Bee (Duckworth et al., 2007), novice teachers’ effectiveness in the classroom in the low-income districts (Duckworth, Quinn and Seligman, 2009), novice teachers’ better performance and retention in the academic midyear (Robertson-Kraft and Duckworth, 2014) as well as the practice of metacognition (Arslan, Akin and Citemel, 2013). Duckworth (2013) also found that grit can predict high school graduation and GPA better than IQ.

But the Grit Scale has been criticized for transparent items, which are easily subject to social desirability (Dimenichi and Richmond, 2015). Two facets of grit are found to be differentially related to behaviour indicators of high grit (Dimenichi and Richmond, 2015). “Consistency of interest” under grit is strongly predictive of career consistency whereas “perseverance of efforts” is related to high GPA (Duckworth and Quinn, 2009). Von Culin, Tsukayama and Duckworth (2014) also revealed that motivational orientation toward engagement was more strongly related to “perseverance of efforts” while motivational orientation toward pleasure had stronger negative association with “consistency of interests”.

The STEP skill measurement survey launched by the World Bank in 2011 included three items from the Grit Scale to assess grit as part of the socio-emotional skills (see Appendix 2). It was implemented in 13 developing countries (Armenia, Azerbaijan, PS Bolivia, Colombia, Georgia, Ghana, Kenya, Lao PDR, FYR Macedonia, Sri Lanka, Ukraine, Viet Nam, and Yunnan Province, China). In general, workers who have more perseverance or grit spent less time on finding their first job after graduation. Respondents who participated in early childhood education are more likely to have a higher level of grit after controlling for other factors like gender, parents’ education, and household socio-economic status. Additionally, respondents who are employed show higher grit in Armenia, Bolivia, Lao PDR, Sri Lanka, and Viet Nam.

The OECD PISA survey also considered perseverance in their 2012 assessment of students from more than 40 countries. Their measure examines “students’ responses to questions asking about the extent to which they feel they resemble someone who gives up easily when confronted with a problem, who puts off difficult problems, who remains interested in the tasks that he or she starts, who continues to work on a task until everything is perfect, and who does more than is expected of him or her when

confronted with a problem” (OECD, 2012). The PISA 2012 asked respondents to answer five questions about their perseverance which were not taken from Duckworth’s Grit Scale (see Appendix C).

The analyses of perseverance in the PISA 2012 report focused on students’ mathematics learning. Students who are more perseverant perform at higher levels in mathematics. However, only 6% of the variance in student performance in mathematics is explained by differences in perseverance measures across OECD countries. Only in five countries (Norway, Finland, Iceland, Sweden and Denmark) did the share of the variance explained by perseverance items exceed 10%.

PISA results also found that, in general, girls reported less perseverance to learn mathematics even when they performed as well as boys. Boys in 26 countries and economies reported higher levels of perseverance (with the difference being statistically significant in nine countries, the United Kingdom, Germany, Austria, France, Sweden, Denmark, Switzerland, Norway and the Republic of Korea) while in 17 countries and economies girls reported higher perseverance (with the difference being statistically significant only in three countries: Montenegro, Bulgaria and Peru). Additionally, in 25 countries and economies, socio-economically advantaged students were found to have higher perseverance. Moreover, the association between perseverance and mathematics performance is stronger among the highest-achieving students.

Perseverance/grit has been found to be malleable. Duckworth and Eskreis-Winkler (2013) conducted a cross-sectional analysis and suggested that grit increases monotonically throughout adulthood. Teaching young students how the brain is changeable when faced with challenges helped them persevere (e.g., Dweck, 2007). Duckworth et al. (2011) executed an experiment in which researchers asked high school students to envision the benefits and obstacles of completing a PSAT practice workbook, and to develop plans to overcome those identified obstacles. Compared to the control group, students who participated in the experiment completed more of the workbook.

Dimenichi and Richmond (2015) designed two experiments to examine the malleability of perseverance and its impact on cognitive performance. In their first experiment, 141 participants were randomly assigned to three groups (“success group”, “failure group” and “control group”) in which they were asked to complete a 10-minute writing assignment via Survey Monkey. For the “success group”, the assignment was to write about a difficult time when they persevered and subsequently succeeded. In the “failure group”, participants were asked to write about a difficult time when they persevered but subsequently did not succeed. In the “control group”, participants needed to write the plot of a recent movie they watched. After the writing exercise, participants were asked to fill out the Grit Scale. In the second experiment, following the written assignment, the three groups of participants were asked to complete a ‘sustained attention to response task’ (SART) (Robertson et al., 1997). The task lasted about 40 minutes with 525 trials of boring tasks in which participants were asked to press the spacebar for every letter appeared on a computer screen except vowels. Results indicated that individuals who reflected on failures tend to have more grit and perform better on a sustained attention tasks. However, individuals who reflected on a difficult time in which they succeeded demonstrated the lowest level of grit and worse task performance. The authors suggested that reflecting on a failure can improve perceived perseverance and performance on cognitive tasks.

In brief, perseverance/grit is malleable by environmental factors. It can be improved by reflecting on failures, beliefs in changeability of brain or cognitive abilities, as well as exercise on envisioning and planning in breaking obstacles.

Self-Control

Self-control is defined as “the capacity for altering one’s own responses, especially to bring them into line with standards such as ideals, values, morals, and social expectations, and to support the pursuit of long-term goals (Baumeister, Vohs, and Tice, 2007, p.351).” There are some other terms used by researchers to describe similar traits such as self-regulation, self-discipline, willpower, effortful control, ego strength, inhibitory control etc. (Duckworth and Kern, 2011).

Duckworth and Kern (2011) summarized three approaches to measure self-control:

1) Executive function tasks. They are used to measure goal-directed, higher-level cognitive processing in which top-down control is exercised over lower-level processes. The measurement (e.g., Behaviour Rating Inventory of Executive Function, Comprehensive Executive Function Inventory) is commonly used for clinical purposes.

2) Delay of gratification tasks. There are four types of study design: hypothetical choice delay task (participants make choices between smaller, immediate rewards and larger delayed rewards in a series of hypothetical questions), real choice delay task (participants make a real choice between a small, immediate rewards and a larger, delayed reward and the decision cannot be revoked), sustained delay task (participants are first asked to choose the preferred delayed reward and then measure the time they can resist the smaller, immediate reward to gain the larger deferred reward), and repeated trials delay task (participants complete a series of trials in which they are asked to choose between smaller, immediate reward and a larger, delayed reward).

3) Self-report personality / informant-report questionnaires. A literature review shows that there are more than 100 unique self-report questionnaires. Frequently used measurements include:

- the Eysenck I7 Impulsiveness Scale (Eysenck et al., 1984), which is used to assess the impulsivity, venturesomeness and empathy with 63 items in a yes/no format
- the Self-Control Scale (Tangney, Baumeister, and Boone, 2004), which directly asks respondents to rate from “not at all like me” to “very much like me” on 10 statements (see Appendix D)
- the Barratt Impulsiveness Scale (Barratt, 1985), which comprises of 30 items that measure six dimensions (attention, motor, self-control, cognitive complexity, perseverance, and cognitive instability impulsiveness) and has been applied to countries from Estonia to Israel and Japan;

Self-control is a coherent but multidimensional construct after examining the convergent validity among different measures, which means that multiple ways of measurement are needed.

Self-control is positively associated with psychological adjustment, interpersonal communication, school GPA, organizational citizenship behaviours, personal initiative, and proactive coping (e.g., Tangney et al., 2004; Duckworth and Seligman, 2005; Hofer et al., 2012; De Boer, Van Hooft and Bakker, 2015).

Baay et al. (2014) surveyed about 400 prospective vocational training graduates in the Netherlands using the 13-item Brief Self-Control Scale (Tangney, Baumeister and Boone, 2004), which has strong correlation with the full scale version ($r=.93$; Tangney, Baumeister and Boone, 2004) and has been used in many other studies among different populations (e.g., Duckworth and Sligman, 2005). Results suggested that self-control predicts students’ preparatory job search behaviour and job search intentions before they enter labour market.

Honken and Ralston (2013) conducted a structural equation modelling analysis on a sample of engineering freshmen. Results showed that lack of self-control in high school was negatively associated with students' GPA in their first semester in college. Self-control is also found to be negatively linked to unwanted pregnancy, smoking, alcohol and drug abuse, and lifetime delinquency (e.g., Baumeister, Heatherton and Tice, 1994; De Ridder et al., 2012, Tangney et al., 2004). Kokko, Pulkkinen, and Puustinen (2000) revealed that low self-control of emotions, especially aggression, at age 8 is directly linked to long-term unemployment in adulthood. Moreover, childhood self-control predicted positive and negative adolescent behaviours which directly and indirectly predict education attainment, income and job satisfaction in adulthood (Converse, Piccone, and Tocci, 2013).

Botchkovar et al., (2015) studied self-control on 7th to 9th graders across 30 countries and found that parenting strategies show a modest effect on self-control in all cultural contexts. Other studies also indicate that positive association between parenting and self-control is generally applied in different cultures and nations (e.g., Cretacci and Cretacci, 2012; Miller, Alvarez-Rivera and Lanza-Kaduce, 2009).

Vazsonyi and Belliston (2007) showed that family process (closeness, support, and monitoring) has an effect on youths' self-control in several countries including Hungary, Japan, the Netherlands, Switzerland, and the United States. Smith and Crichlow (2013) examined self-control among college students from Malta, Trinidad and Tobago, and the United States and found cultural invariance. They also found that ineffective parenting decreases self-control across the three regions.

Accumulative studies have demonstrated that self-control is greatly impacted by the environment. Self-control/self-regulatory in childhood predicts educational attainment, health, financial stability and job satisfaction (e.g., Moffitt et al., 2011; Converse, Piccone and Tocci, 2013). Experiences in early childhood initially help develop brain regions related to self-control (Tarullo, Obradovic, and Gunnar, 2009). Some risk factors are found to negatively impact children's self-control skill such as poverty, parents who are chronically depressed, and minority status (Evans and Rosenbaum, 2008; Sektnan et al., 2010).

But interventions implemented later through education or parenting can promote individuals' self-regulation and effectively lower the impact from those risk factors (McClelland and Tominey, 2014). Regular practices of self-regulation games in school or at home can significantly improve children's self-control and early academic achievement at preschool (McClelland and Tominey, 2014; Schmitt et al., 2013; Tominey and McClelland, 2011).

Merritt et al. (2012) found that teacher's emotional support is positively related to child's aggression and behavioural self-control. Their studies also suggested that teachers' emotional support in classroom interactions is equally critical for all children regardless of socioeconomic status.

According to Tarullo, Obradovic, and Gunnar (2009), some effective intervention programs have been developed to help train children's brains to have better self-control. The curriculum is designed specifically to increase the control of attention, cognition and the ability to suppress impulses. One of the examples is the Tolls of the Mind curriculum which include a set of 40 activities to help kids learn how to resist impulses, avoid distractions, facilitate memory, and switch mindsets flexibly. Research findings on low-income urban preschool children show that children who participated in the program performed better in attention-control tasks (Diamond et al., 2007).

Flook et al. (2015) conducted a project in which a 12-week mindfulness-based Kindness Curriculum (KC) was delivered to a sample of 68 public preschool children with the purpose of improving

children's executive function, self-regulation and prosocial behaviour. It is believed that mindfulness training, which entails noticing when the mind has wandered from an attended object and returning attention to the target object, can increase the ability to engage self-regulatory neural circuits in prefrontal cortical regions, resulting in improved sustained attention and self-control (e.g., Lutz et al., 2008; MarcLean et al., 2010). Results show that children who received the KC intervention demonstrated greater improvements in social competence and earned higher grades in cognitive learning, health and social-emotional development, compared to the control group.

Additionally, the authoritative parenting style (positive control, autonomy support, and responsiveness) is found to be highly associated to strong self-regulation (e.g., Bernier, Carlson and Whipple, 2010). Adults who spend time on explaining the reasons behind their actions and discipline decisions to children can help the development of critical thinking skills and self-regulation skills (McClelland and Tominey, 2014).

Research also found that not only for children, but also for adults, practicing self-control more can lead to better self-control on a task (e.g., Muraven, Baumeister, and Tice, 1999). Muraven (2010) assessed the impact of a two-week regular practice of small acts of self-control on ninety-two adults' self-control capacity and found positive effect on self-control performance.

Social Skills

There are a variety of definitions for social skills or social competency but they share some commonality (Malinauskas, Gudonis, and Sniras, 2007). For example, Segrin (2001) defined social skills as the ability of establishing compatible and effective relations with others. Welsh and Bierman (1998) defined social skill as an individual's knowledge of and ability to use appropriate social behaviours that are pleasing to others in interpersonal situations. There are two measurement tools are frequently used to assess social skills.

Riggio (1986) created an assessment called Social Skills Inventory (SSI) which is composed of 90 items that measure six sub-dimensions of social skills in emotional and social domains (emotional expressivity (EE), emotional sensitivity (ES), emotional control (EC), social expressivity (SE), social sensitivity (SS), and social control (SC)). Individual communication skills are assessed through scales on verbal expressivity (SE) and non-verbal expressivity (EE). Interpretation skills are assessed through scales on verbal sensitivity (SS) and non-verbal sensitivity (ES). The ability to control and regulate is measured by scales on verbal control (SC) and non-verbal control (EC). Oldmeadow, Quinn, and Kowert (2012) abridged the 90 items SSI to 24 items by selecting the four highest loading items in each of the six sub-dimensions (see Appendix E).

The Interpersonal Competence Questionnaire (ICQ, Buhrmester et al., 1988) contains 40 self-reported items, which examine five interpersonal skills domains: initiation, self-disclosure, conflict management, emotional support, and negative assertion (see Appendix F). Research indicates that the questionnaire has good reliability (e.g., Muralidharan et al., 2011).

Generally, social skills have great impact on individual academic success in concurrent and later grades at school, career choice, professional and peer interactions and psychological health (e.g., Williams and Galliher, 2006; Shernoff, 2010; Rhoades et al., 2011; Galindo and Fuller, 2010; Gresham et al., 2011; Teo et al., 1996; Schoon and Duckworth, 2012; Obschonka et al., 2012). Social skills deficits result in short- and long-term negative consequences such as peer relationship difficulties (Dodge and Coie, 1987), adult psychopathology (Parker and Asher, 1987) and poor academic adjustment for children (e.g., Hoge and Luce, 1979). Social skills moderate the association between conscientiousness and job

performance (Witt and Ferris, 2003) and help improve productivity and career success (Riggio et al., 2003).

Baron and Markman (2003) studied social competence (e.g., accuracy in perceiving others, impression management skills, persuasiveness) of entrepreneurs in two industries (cosmetics and high-tech). The researchers adopted 18 SSI items and developed some additional items to assess social competence (see Appendix G). Accuracy in perceiving others was positively linked to entrepreneurs' financial success from both industries. Social adaptability was found to be positively related to financial success in entrepreneurs from the cosmetics industry and expressiveness was linked to the success of entrepreneurs from the high-tech industry.

LaFreniere et al. (2010) examined social competence and emotional development of 4,640 preschool children from eight countries (Austria, Brazil, Canada, China, Italy, Japan, the Russian Federation and the United States) using the Social Competence and Behaviour Evaluation Inventory (SCBE; P. J. LaFreniere and J. E. Dumas, 1995). The SCBE has been widely used by educators or clinicians to evaluate young children between 2.5 and 6 years of age on social competence, affective expression and adjustment in different countries (LaFreniere et al., 2002). Findings showed that preschool boys were significantly more aggressive and less socially competent than girls can be generalized across nations. However, age trends in social competencies patterns show some cultural variances. In Austria, Italy and the United States, there is a significant decrease in aggression between the ages of 3 and 6 years. In Japan, anger-expression is very low in the early preschool years but rises slightly thereafter.

Rahim et al. (2006) investigated the relationships between emotional intelligence (EQ)—empathy and social skills—and transformational leadership in Bangladesh, Greece, Portugal, the Republic of Korea and the United States. Twelve items from the EQ Index (Rahim et al., 2002) were selected and the findings suggested similarities in the responses across nations. Additionally, a comparative study conducted in the U.S. and Malaysia revealed that the association between social skills and psychological well-being has been found similarly positive in both countries (Demir et al., 2012).

However, many studies recognized that the ways children express and control emotions are influenced by cultural norms (Miller and Sperry, 1987; Rogoff, 2003; Son, 2014). Miller and Sperry (1987) pointed out that individual behavioural characteristics, including emotional expression can, like aggression, be affected by social and cultural contexts. Thus, observing behaviours to judge individual social skills can be problematic. For example, sensitivity and shyness are often regarded as mature and well-behaved behaviour in children from traditional Chinese culture perspective (Chen, 2009). However, children's shyness is negatively viewed as weakness in social skills in most of the western countries (Katz and McClellan, 1997). In Japan, school education emphasizes training on children's listening social skills while in the United States students are more expected to be good speakers. Being silent as a careful listener is considered to have lower social skills in the western culture (Hatano and Inagaki, 1998).

Social skills training is usually provided as a group intervention for children that includes, for example, development programs for friendship and conversational skills, anger management, empathy training and perspective taking (Kjøbli and Ogden, 2014). The majority of studies on social skills intervention focuses on children who have social communications problems. Very few studies have been conducted on regular children or adults.

The results for social skills training interventions research have been a mix (Kjøbli and Ogden, 2014). For example, Webster-Stratton, Reid, and Hammond (2001) examined the effect of the Incredible Years Dinosaur Social Skills and Problem Solving Curriculum on children aged 4-8 years old who had early-onset conduct problems. Findings showed that children who were randomly assigned to the

training treatment group had significant improvement on aggressive and noncompliant behaviours compare to those in the control group. While (Lösel and Beelmann (2003) found that social competency interventions' effects varied on different population. Their study revealed that the intervention had strongest impact on children who had experienced critical life events and who lacked social stimulations Children who had anxiety, isolation and loneliness benefited most from the intervention. However, the interventions have less influence on children with conduct problems than children with internalizing problem generally (Kjøbli and Ogden, 2014). Moreover, Losel and Beelmann (2003) conducted a meta-analysis and found social competence training had small short-term effect on behavioural and mental health issues but the impact intended to be smaller in the long term.

Curriculum of Non-Cognitive Skills across Countries

The majority of the OECD countries have integrated some non-cognitive skills in their national curriculum design though each country has its own definition of these skills. Many countries refer to a set of key competencies or skills that have to be acquired as learning objectives for a certain level of education. For example, Zambia curriculum makes reference to ten key competencies including, but not limited to self-management, relationships with others, innovation, entrepreneurship and productivity, and psychosocial life skills. Malta emphasises personal social skills in secondary education and focuses on social competences, communicative competences and learning dispositions (e.g., perseverance, concentration) in their early year's curriculum framework. According to the Malta Ministry of Education, Employment and the Family (2011), young children are expected to “learn how to deal with their feelings, recognize and label emotions, accept themselves and learn to be comfortable with themselves and others. In developing socio-emotional competences, young children acquire self-discipline as they learn to be more in control of who they are and what they do (p.20)”. Kosovo's curriculum framework lists personal competency involving self-concept, self-confidence, self-regulation of emotions and stress, empathy, and healthy lifestyle as one of the main learning outcomes that students have to achieve in the pre-university education. Similarly, Estonia has the following set of general non-cognitive competencies that are expected to be gained by the end of upper secondary education: value competence, social competence, self-management competence, learning to learn competence, communication competence, and entrepreneurship competence.

More and more countries emphasize non-cognitive competencies in their learning objectives of national curriculum. However, the assessment of these competencies is extremely difficult and undesirably restrictive (Tedesco, Operti & Amadio, 2013). Pepper (2011) analysed the key competencies assessment issues in EU countries and found that skills assessments usually focus on cognitive dimension while non-cognitive skills are seldom considered in neither national nor international assessments. The implementation of the OECD's PISA 2012 and the World Bank's STEP which both include some direct questions on non-cognitive skills reveals that the direct measures of non-cognitive skills are being advanced.

Challenges for Global Monitoring

Although there has been some progress in developing and measuring non-cognitive skills, there is currently no such systematic global measure. Several factors hinder the global monitoring of non-cognitive skills.

Unlike the literacy and numeracy skills, non-cognitive skills cannot be measured directly through standardized tests. It's captured by measurement of performance on tasks or behaviours. Self-reported questionnaires are used to ask about respondents' behaviour. The assumption that answers to the

performance questions can actually reflect one's behaviour is problematic. Task performance usually depends not only on individual's non-cognitive skills but also on cognitive ability as well as incentives and emotion at the time of performing tasks, affected by various environmental factors.

Non-cognitive skills are relatively stable at a particular life stage, but they are greatly influenced by culture. For example, horizontal collectivist cultures (e.g., the Israeli kibbutz) value empathy, sociability and cooperation more than others (Triandis & Gelfand, 1998). Some non-cognitive skills that are emphasized in the labour market in one country may not be in the other and can even result in negative consequences (Miyamoto, Huerta, & Kubacka, 2015). Some skills are demonstrated in a culturally specific way. The corresponding effective behaviours may differ from region to region. For instance, Finns are less willing to initiate communication with people (McCroskey & Richmond, 1990) but are most talkative when communicating in informal encounters with others (Sallinen-Kuparinen, 1986). Given the distinct communication behaviours in different countries, definitions for social communication skills may vary. Thus, the development of a universal non-cognitive skills measurement that allows cross-country comparisons is challenging.

The lack of solid evidence showing which soft skills, to what extent, in what situation is most predictive of academic and workforce outcomes, inhibits effective non-cognitive skills assessment across countries. Perseverance usually helps individual to keep trying over and over again to overcome obstacles or challenges to accomplish final goal. It improves children's mathematics performance and increases college students' retention. However, too much perseverance may lead to stubbornness and less adaptability to the environment in some cases. Tolerance and agreeableness can reduce or avoid conflicts in teamwork but too much can harm creativity. Self-control helps individuals to use willpower to function appropriately and work more productively whereas exerting too much self-control may backfire, raising levels of frustration and aggression (Megargee, 1966). So far, limited research has been conducted to provide further evidence on validity of each non-cognitive skill in different situations.

Many non-cognitive skills develop monotonically over the life cycle. Skill attainment at one stage of the life cycle may suggest the success or failure of local education policy. Further differentiation will be likely to appear at the later stages if skills are not learned in previous stages. Global measurement on non-cognitive skills needs to be designed and implemented for different stages to reflect trends. However, there's no standard established to track non-cognitive skills development in different stages. Non-cognitive skills assessment cannot be used as a tool to demonstrate accountability.

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Appendix A. 12- Item Grit Scale

How well does each of the following statements below describe you? 1 (very much like me), 5 (not at all like me)

I have overcome setbacks to conquer an important challenge.

New ideas and projects sometimes distract me from previous ones.*

My interests change from year to year.*

Setbacks don't discourage me.

I have been obsessed with a certain idea or project for a short time but later lost interest.*

I am a hard worker.

I often set a goal but later choose to pursue a different one.*

I have difficulty maintaining my focus on projects that take more than a few months to complete.*

I finish whatever I begin.

I have achieved a goal that took years of work.

I become interested in new pursuits every few months.*

I am diligent.

Appendix B. Three Grit Items on the World Bank STEP Measurement

Do you finish whatever you begin?

Do you work very hard? For example, do you keep working when others stop to take a break?

Do you enjoy working on things that take a very long time (at least several months) to complete?

Note: Responses on the Likert scale are ranged from 1, "almost never" to 4, "almost always".

Appendix C. Perseverance Items in the PISA 2012 Measurement

When confronted with a problem, I give up easily

I put off difficult problems

I remain interested in the tasks that I start

I continue working on tasks until everything is perfect

When confronted with a problem, I do more than what is expected of me

Appendix D. Self-Control Scale (Tangney, Baumeister and Boone, 2014)

First, please read the following 10 statements and for each, check the box that best represents you.

	Not at all like me	A little like me	Some what like me	Mostly Like Me	Very much like me
I have a hard time breaking bad habits.	5	4	3	2	1
I get distracted easily.	5	4	3	2	1
I say inappropriate things.	5	4	3	2	1
I refuse things that are bad for me, even if they are fun.	1	2	3	4	5
I'm good at resisting temptation.	1	2	3	4	5
People would say that I have very strong self-discipline.	1	2	3	4	5
Pleasure and fun sometimes keep me from getting work done.	5	4	3	2	1
I do things that feel good in the moment but regret later on.	5	4	3	2	1
Sometimes I can't stop myself from doing something, even if I know it is wrong.	5	4	3	2	1
I often act without thinking through all the alternatives.	5	4	3	2	1

Next, add up all the points for the checked boxes and divide by 10. The maximum score on this scale is 5 (extremely self-controlled), and the lowest score on this scale is 1 (not at all self-controlled).

Appendix E. Riggio (1986)'s Social Skills Inventory

Responses were given on 5-point scales from 1 (not at all like me) to 5 (exactly like me).

Emotional Expressivity (EE):

- I usually feel uncomfortable touching other people (*).
- Sometimes I have trouble making my friends and family realize how angry or upset I am with them (*).
- I often touch my friends when talking to them.
- I rarely show my feelings or emotions (*).

Emotional Sensitivity (ES):

- I can easily tell what a person's character is by watching his or her interactions with others.
- I always seem to know what peoples' true feelings are no matter how hard they try to conceal them.
- I can accurately tell what a persons character is upon first meeting him or her.
- I can instantly spot a "phony" the minute I meet him or her.

Emotional Control (EC):

- I am not very skilled in controlling my emotions (*).
- It is very hard for me to control my emotions (*).
- I am very good at maintaining a calm exterior even if I am upset.
- I am rarely able to hide a strong emotion (*).

Social Expressivity (SE):

- I love to socialize.
- I always mingle at parties.
- At parties I enjoy talking to a lot of different people.
- I enjoy going to large parties and meeting new people.

Social Sensitivity (SS):

- I am very sensitive of criticism.
- It is very important that other people like me.
- I am generally concerned about the impression I am making on others.
- I am often concerned what others are thinking of me.

Social Control (SC):

- When I am with a group of friends I am often the spokesperson for the group.
- I find it very difficult to speak in front of a large group of people (*).
- I am usually very good at leading group discussions.
- I am often chosen to be the leader of a group.

Appendix F. Interpersonal Competence Questionnaire (ICQ)

Items grouped by ICQ scale

Initiation

1. Asking or suggesting to someone new that you get together and do something, e.g., go out together.
 6. Finding and suggesting things to do with new people whom you find interesting and attractive.
 11. Carrying on conversations with someone new whom you think you might like to get to know.
 16. Being an interesting and enjoyable person to be with when first getting to know people.
 21. Introducing yourself to someone you might like to get to know (or date).
 26. Calling (on the phone) a new date/acquaintance to set up a time to get together and do something.
 32. Presenting good first impressions to people you might like to become friends with (or date).
 36. Going to parties or gatherings where you don't know people well in order to start up new relationships.
-

Negative Assertion

2. Telling a companion you don't like a certain way he or she has been treating you.
 7. Saying "no" when a date/acquaintance asks you to do something you don't want to do.
 12. Turning down a request by a companion that is unreasonable.
 17. Standing up for your rights when a companion is neglecting you or being inconsiderate.
 22. Telling a date/acquaintance that he or she is doing something that embarrasses you.
 27. Confronting your close companion when he or she has broken a promise.
 32. Telling a companion that he or she has done something to hurt your feelings.
 37. Telling a date/acquaintance that he or she has done something that made you angry.
-

Disclosure

3. Revealing something intimate about yourself while talking with someone you're just getting to know.
 8. Confiding in a new friend/date and letting him or her see your softer, more sensitive side.
 13. Telling a close companion things about yourself that you're ashamed of.
 18. Letting a new companion get to know the "real you."
 23. Letting down your protective "outer shell" and trusting a close companion.
 28. Telling a close companion about the things that secretly make you feel anxious or afraid.
 33. Telling a close companion how much you appreciate and care for him or her.
 38. Knowing how to move a conversation with a date/acquaintance beyond superficial talk to really get to know each other.
-

Emotional Support

4. Helping a close companion work through his or her thoughts and feelings about a major life decision, e.g., a career choice.
 9. Being able to patiently and sensitively listen to a companion "let off steam" about outside problems s/he is having.
 14. Helping a close companion get to the heart of a problem s/he is experiencing.
 19. Helping a close companion cope with family or roommate problems.
 24. Being a good and sensitive listener for a companion who is upset.
 29. Being able to say and do things to support a close companion when s/he is feeling down.
 34. Being able to show genuine empathetic concern even when a companion's problem is uninteresting to you.
 39. When a close companion needs help and support, being able to give advice in ways that are well received.
-

Conflict Management

5. Being able to admit that you might be wrong when a disagreement with a close companion begins to build into a serious fight.
 10. Being able to put begrudging (resentful) feelings aside when having a fight with a close companion.
 15. When having a conflict with a close companion, really listening to his or her complaints and not trying to "read" his/her mind.
 20. Being able to take a companion's perspective in a fight and really understand his or her point of view.
 25. Refraining from saying things that might cause a disagreement to build into a big fight.
 30. Being able to work through a specific problem with a companion without resorting to global accusations ("you always do that").
 35. When angry with a companion, being able to accept that s/he has a valid point of view even if you don't agree with that view.
 40. Not exploding at a close companion (even when it is justified) in order to avoid a damaging conflict.
-

Appendix G. Social Competence Measurements Adopted in Baron and Markman (2003)'s Study

Items
Social Perception
V11. I'm a good judge of other people
V29. I can usually recognize others' traits accurately by observing their behavior
V9. I can usually read others well — tell how they are feeling in a given situation
V23. I can tell why people have acted the way they have in most situations
V21. I generally know when it is the right time to ask someone for a favor
Social adaptability
V8. I can easily adjust to being in just about any social situation
V7. I can be comfortable with all types of people — young or old, people from the same or different backgrounds as myself
V17. I can talk to anybody about almost anything
V2. People tell me that I'm sensitive and understanding
V15. I have no problems introducing myself to strangers
Expressiveness
V18. People can always read my emotions even if I try to cover them up
V6. Whatever emotion I feel on the inside tends to show on the outside
V4. Other people can usually tell pretty much how I feel at a given time
V5. I am very sensitive to criticism from others
V14. I am often concerned about what others think of me
Impression management
V26. I'm good at flattery and can use it to my own advantage when I wish
V24. I can ready seem to like another person even if this is not so