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Measuring Resilience as an Education Outcome

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1. Executive Summary

The focus of this project is on the assessment of transferable skills, and specifically resilience. Resilience has been defined as "the capacity of the person, family, or community to prevent, minimize, overcome, or thrive in spite of negative or challenging circumstances" (Wagnild & Young, 1993). In this report, Social Research and Demonstration Corporation (SRDC) investigates the most appropriate measures to assess resilience as a learning outcome of Ontario's postsecondary education (PSE) system. The long-term aim is to support the Higher Education Quality Council of Ontario (HEQCO) in its efforts to determine the role of PSE in enhancing resilience as a transferable skill.

Interest in measuring resilience as an outcome of education stems from growing recognition of the role transferable skills play in becoming well-prepared for a successful and productive life and participating fully in today's knowledge economy. While traditionally such skills have not explicitly been taught or assessed in the context of formal education, they are considered vital for success across life domains (e.g., Majid, Liming, Tong & Raihana, 2012). Furthermore, students are expected to acquire these skills as part of their postsecondary training. A recent review of credential options and opportunities by SRDC (2015) found that colleges and universities perceived their programs to be delivering the appropriate level and mix of transferable skills given the fields of study. Furthermore, universities perceived transferable skills critical to success in employment to be appropriately developed through their degree programs, while colleges acknowledged that their programs should emphasize essential skills development.

Postsecondary learning outcomes – what college and university students should know and be able to do by the end of a course of study – form a central part of the research mandate of HEQCO. It is seeking to identify learning outcomes that can be utilized to assess the quality of Ontario's public college and university programming. HEQCO has adopted a framework which includes four types of learning outcomes relevant to postsecondary education: discipline-specific outcomes, basic cognitive outcomes, higher-order cognitive outcomes and transferable skills.

We report here on means to assess one key transferable skill: resilience. The work has been structured in two main stages: (1) A literature review that examines the different ways in which researchers have defined and conceptualized resilience, and then identifies the most appropriate measures that operationalize resilience as a transferable skill, and (2) An analytical phase considering the applicability of popular resilience measures to the target population of interest using SRDC's own longitudinal data.

The review of the literature demonstrated that resilience has been defined and operationalized in diverse ways. The understanding of resilience has changed over the years and continues to evolve today. Lack of a single clear definition has led to the construction of several different instruments to measure different dimensions of resilience. In total, SRDC reviewed 17 of the 47 resilience measures identified in the literature. All of the retained measures are self-report scales that capture subjective or perceived resilience targeting older adolescents, young adults and adults. The measures vary in length and cover one to seven dimensions. Some measures reflect the complexity of the construct by including a wide spectrum of factors to operationalize resilience, including external factors, personal assets and coping processes, while others focus almost exclusively on personal assets. Overall, the retained measures possess respectable psychometric properties (i.e., reliability and validity) and most of them appear adequate for use with

postsecondary students. In terms of content validity, our review shows that several dimensions included in the measures could be construed as learning outcomes of PSE.

In the analytical phase, we performed analyses using SRDC's own longitudinal data from two recent demonstration projects: Future to Discover (FTD) and the British Columbia Advancement Via Individual Determination (BC AVID) pilot project (Ford et al., 2012; Ford et al., 2014). These experiments recruited students in early high school and tracked them for six or more years to determine the impacts of experimental education interventions intended to improve postsecondary access. The projects' datasets span several surveys of students' educational trajectories, running from baseline (in grade 8 or 9) to 66 months later – the last survey contained the resilience measure – as well as linked data from administrative records on each student's K-12 and postsecondary participation and achievement, plus student financial aid.

SRDC's analyses of FTD data supported the psychometric properties of the included measure (Brief Resilience Scale, or BRS) and the relevance of the instrument for use with postsecondary students across a variety of subgroups in the Canadian context. The results provide evidence that the BRS can moderately predict postsecondary outcomes characterized as 'resilient,' such as enrolment in university, continued participation in PSE and graduation from university. However, the findings also suggest that longitudinal research is needed to evaluate the measure's ability to assess accurately student-level changes over time, and to better understand the overall role of resilience in students' PSE experience. The results of SRDC analyses using the BC AVID data showed that the included measure (the two-item Connor-Davidson Resilience Scale or CD-RISC2) was associated with educational outcomes in the expected direction and also supported its use with young Canadian adults in the educational context. However, given the lack of variability in the CD-RISC2, this measure may have limitations in terms of its ability to detect student level change over time.

It appears clear from our findings that resilience can be viewed as a multidimensional construct and studied from a number of different perspectives. SRDC has recommended some of the reviewed measures as promising scales for HEQCO to take forward for further consideration. However, it should be noted that none of the measures was conceptualized to assess the acquisition of transferable skills. Thus it is unclear whether or not they deliver evidence of learning such skills. Furthermore, there is no evidence that they measure outcomes of postsecondary learning. It may be appropriate to break down the more complex measures into separate dimensions reflecting specific skills taught in the PSE context rather than adopting a broad index of resilience. Our review has found that research on resilience is still evolving and that little has been done to design tools specifically for use at the postsecondary level. More research is needed in this area. In the meantime, we can look to 'learning skills and work habits' assessed in Ontario's elementary and secondary schools for inspiration. Following that model, it may be advisable to align both the language and learning outcomes not only across PSE institutions, but throughout the continuum of education spanning the elementary, secondary and postsecondary levels.

2. Introduction

Interest in measuring resilience as an outcome of education stems from growing recognition of the role transferable skills play in becoming well-prepared for a successful and productive life and participating fully in today's knowledge economy. While traditionally such skills have not explicitly been taught or assessed in the context of formal education, they are considered vital for success across life domains (e.g., Majid, Liming, Tong & Raihana, 2012). Furthermore, students are expected to acquire these skills as part of their postsecondary training. A recent review of credential options and opportunities by the Social Research and Demonstration Corporation (SRDC, 2015) found colleges and universities perceived their programs to be delivering the appropriate level and mix of transferable skills given the fields of study. Furthermore, universities perceived transferable skills critical to success in employment to be appropriately developed through their degree programs, while colleges acknowledged that their programs should emphasize soft skills development.

There has certainly been a trend in Ontario to incorporate some of these skills into curriculums in grades 1 to 12, including skills such as responsibility, organization, independent work, collaboration, initiative and self-regulation (Ministry of Education, 2010). These learning skills and work habits are currently formally evaluated on report cards as learning outcomes of students' education. Learning outcomes refer to "measurable statements of student knowledge (what successful students should know) and skills (what successful students should be able to do) expected upon graduation" (Lennon et al., 2014, p. 3). Global trends also reveal much progress being made in broadening the scope of learning outcomes (SRDC, 2015), such that they are increasingly being applied at the postsecondary level as well.

The Higher Education Quality Council of Ontario (HEQCO) recognizes the importance of identifying and evaluating a broader set of learning outcomes to adequately describe and assess the skills that students are expected to learn in Ontario postsecondary institutions. HEQCO has adopted a typology that includes four different classes of postsecondary learning outcomes (Deller et al., 2015). These include:

1. Discipline-specific outcomes, such as knowledge and content relevant to specific fields;
2. Basic cognitive outcomes, including numeracy and literacy;
3. Higher-order cognitive outcomes, such as critical thinking, problem solving and communication skills; and
4. Transferable outcomes, which are also referenced in the literature as non-cognitive or behavioural skills (Weingarten, 2014, Feb. 13, cited in Deller et al., 2015).

The focus of this report is on the fourth category of learning outcomes labeled 'transferable skills.' Transferrable skills refer to a "set of personality and behavioural attributes – such as resilience, teamwork, time management and work ethic – that may be most relevant to success in the workplace" (Goleman, 1998, p. 4, cited in Deller et al., 2015), but scholars suggest that they may also contribute to academic and personal success (Conley, 2013; Majid et al., 2012).

Of particular interest for this report is resilience as a learning outcome of PSE. Resilience has been defined as "the capacity of the person, family, or community to prevent, minimize, overcome, or thrive in spite of negative or challenging circumstances" (Wagnild & Young, 1993). Past research has shown that resilience training is associated with a host of positive outcomes such as self-efficacy, cognitive control and self-

awareness (Delany et al., 2015), academic achievement (De Boca, 2010), as well as lower stress, goal attainment and productivity in the workplace (e.g., Grant, Curtayne, & Burton, 2009; Pipe et al., 2012).

Despite these encouraging findings, most of the research to date has focused on children or at-risk youth rather than young adults. Ontario's postsecondary institutions are not systematically measuring transferable skills such as resilience at the student level. While the need to teach and measure transferable skills is commonly accepted, assessment of resilience in postsecondary institutions is typically limited to counselling or advisory purposes. As such, resilience has not yet been studied or assessed as a learning outcome of PSE.

HEQCO has asked SRDC to investigate the most appropriate measures to assess resilience as a learning outcome of Ontario's postsecondary education. The long-term aim is to support HEQCO's efforts to determine the role of PSE in enhancing resilience as a transferable skill.

SRDC has a history of working on projects that align with Ontario's specific interest in ensuring that its postsecondary students are psychologically equipped to cope with setbacks and adversity. For example, the Future to Discover (FTD) project developed and evaluated an intervention for grades 10-12 students that in grade 12 sought to promote their resilience in PSE (Canadian Career Development Foundation, 2007; Ford et al., 2012). Furthermore, the British Columbia Advancement Via Individual Determination (BC AVID) pilot project tested how effectively the AVID program – designed to help high school students acquire transferable skills – increased access to postsecondary education (PSE) in a Canadian context. In both of these projects, a measure of resilience was included in student surveys during their early postsecondary years. These studies provided a rare attempt in Canada to measure resilience in a representative cross-section of young people in their early 20s as part of a rigorous exercise to attribute changes in resilience to an educational intervention.

Thus SRDC was able to investigate resilience in two complementary ways. It has conducted a traditional literature review to consolidate current knowledge on the assessment of resilience and a re-analysis of the raw data from the two projects cited above. The data provided a unique opportunity to explore the reliability and validity of two resilience scales in samples that closely resemble the HEQCO target population.

Accordingly the report is structured in two main sections:

- A literature review that examines the different ways in which researchers have defined and conceptualized resilience, and then identifies the most appropriate measures that operationalize resilience as a transferable skill.
- An analysis of the applicability of two popular resilience measures to the target population of interest. Specifically, SRDC conducted new analyses using its longitudinal surveys of young people, which include popular measures of resilience.

3. Literature review

The purpose of this literature review was to identify the most appropriate measure to assess resilience as a learning outcome of Ontario's postsecondary education. The review was intended to help HEQCO in its endeavours to determine the role of PSE in enhancing resilience as a transferable skill of Ontarians. Given the lack of definitional consensus in the literature, the review also examined the different ways in which

researchers have defined and conceptualized resilience. More specifically, it considered the following key research questions:

- How is resilience defined?
- What available measures exist to assess resilience?
- With whom have these measures been applied?
- How valid and reliable are these instruments?
- Which measure is most appropriate to assess resilience as a learning outcome of PSE?

Resilience is operationalized and assessed in the literature in many ways but we focused our review on applications that aligned best with the operationalization of resilience as a transferable skill.

4. Methodology

4.1 Literature Search

A search using online resources, as well as articles available through the ERIC, PsycINFO and PsycTESTS databases, provided an overview of the research on resilience. A variety of search strategies were used (to account for variations in the operationalization of resilience) in the process of identifying measures that would assess it. We conducted initial searches to identify prior literature reviews and meta-analysis on the topic of resilience. Abstracts were scanned to identify relevant articles that addressed the operationalization of resilience.

We then conducted searches on different databases that included studies that assessed resilience, as well as those describing scale development or validation of resilience-related constructs, limiting our search to French and English publications in the past 15 years (i.e., 2000-2015). SRDC also scanned reference lists of review papers and other relevant articles for additional scales. Based on the findings, we searched for specific instruments that have been used to measure resilience and the articles that described their development and original validation. The names of measures were then used to identify other works, using them to obtain further knowledge on their respective psychometric properties.

4.2 Selection Criteria for Measures

Our goal was to identify measures that could plausibly evaluate resilience as a *learning outcome of postsecondary education*. We therefore applied a number of inclusion and exclusion criteria to focus our review on measures that would be most relevant for postsecondary students. In our initial selection, we retained all measures that were developed for or tested with samples of older adolescents, young adults or adults. We then narrowed our selection and excluded measures based on the following criteria.

We excluded measures that:

- were developed for and only tested with clinical populations;
- were designed and only used with young children or older adults;
- were developed and only used in another country, in a language other than English or French;
- assess a very narrow scope of the resilience construct;
- assess only external risk or external protective factors;
- conceptualized resilience as a stable personality trait;
- were too context-specific.

The rationale for these criteria appears in the section 'Definitions of Resilience.'

4.3 Quality Assessment of the Measures

We evaluated the quality of the retained measures by examining their reliability and validity on the basis of the psychometric properties reported in original development and validation studies, and in additional studies using them as research tools. The different criteria used to assess the quality of the measures are briefly described below as defined by Sax (1997). Where applicable, we used established guidelines to determine broad cut-off criteria (Fitzpatrick, Davey, Buxton & Jones, 1998; Kline, 1998).

Reliability assesses the level of consistency of observations or scores. In this literature review, we examined two reliability indicators: the internal consistency of the measures and their test-retest reliability.

- *Internal consistency* refers to the consistency or homogeneity of responses to individual items on a measure. When a measure covers several dimensions of a construct, separate internal consistency coefficients are typically reported for each of the dimensions (or subscales) of the measure. A Cronbach alpha coefficient (α) or intra-class correlation (ICC) of .70 or higher is generally considered acceptable.
- *Test-retest reliability* refers to the degree of stability of an individual's score on a measure over a period of time. The time elapsed between two measures should be appropriate to the measure, with longer time intervals suitable for relatively stable traits (e.g., hardiness) and shorter ones for fluctuating characteristics (e.g., mood). Values greater than .70 are typically considered adequate.

Validity assesses the accuracy of an assessment, that is, how well it measures what it was intended to measure. While there are several different types of validity indicators described in research and different ways of evaluating them, they can be categorized broadly as content, construct, criterion and external validity.

- *Content validity*: In a first step, we examined the content of the measures to determine if it was suitable for the aims of the project. The content was deemed appropriate if the measure could be construed as a "learning outcome" of PSE. This step was only possible for the measures we could access.
- *Construct validity*: There are several ways of assessing how well a theorized underlying construct is being accurately measured. Here, we focused on the extent to which the components of measures reflect the theoretical construct they were designed to measure by looking at the structural aspects

of the measures (i.e., the number of postulated dimensions or factors and their replicability with different samples).

- *Criterion validity*: To evaluate the criterion validity, we looked for positive correlations between the resilience measures and other resilience-related measures (i.e., convergent/concurrent validity), an absence of correlations between the resilience and theoretically unrelated measures (i.e., divergent validity/discriminate validity), as well as positive correlations between the resilience measures and subsequent outcome measures (i.e., predictive validity). Significant correlations of .30 or greater are considered adequate.
- *External validity*: Finally, we evaluated the external validity by examining the different population samples the measures were tested with to determine if they would be appropriate for administration to postsecondary students.

5. Definitions of Resilience

Much of the research drawn from our search appears to focus on 'at-risk' or vulnerable populations such as refugees, veterans, individuals with low socioeconomic status, First Nation families, children with disabilities, youth in child protective services, or those who have experienced physical or psychological stress/trauma (e.g., post-traumatic stress disorder, burnout, coping with the aftermath of war, pediatric illnesses, abuse, pain). However, more recent studies have examined resilience in different domains such as the workplace (e.g., Robertson, Cooper, Sarkar & Curran, 2015; Winwood, Colon & McEwen, 2013) and in the educational context (e.g., The Canada Millennium Scholarship Foundation, 2007; Knight, 2007; Koenig et al., 2013). The broad variations in contexts and populations studied have given rise to a number of different operational definitions of resilience.

Perspectives on resilience have evolved over time and have shaped the way it has been conceptualized. Early work on resilience is rooted in the field of developmental psychology, with the need to understand why some children appeared to be immune to chronic stress or trauma (Fleming & Ledogar, 2008). From this perspective, resilience was defined as a set of personal characteristics that help buffer and recover from the negative effects of stress (Ungar, 2008). However, researchers soon recognized that the ability to 'bounce back' in the face of adversity was influenced by several external factors (Fleming & Ledogar, 2008). We found that a number of studies in the past 15 years have investigated "risk and protective factors" in the family, school and community that are presumed to hinder or promote resilience. Consistent with the biopsychosocial perspective, some researchers now view resilience as a dynamic process that involves complex interactions between internal characteristics and external conditions (Pangallo, Zibarras, Lewis & Flaxman, 2015). From this perspective, resilience is thought to evolve with time and to be amenable to change (Windle, Bennett & Noyes, 2011). Grounded in early resilience research, some authors posit that an innate capacity for resilience exists (e.g., Werner & Smith, 1982), but others maintain that it can be taught and developed (Masten, 2001).

In fact, identification of key predictors and correlates of resilience has led to the development of frameworks and a number of proposed interventions designed to promote it (e.g., Knight, 2007; Robertson et al., 2015). For example, following a review of the literature, Knight (2007) proposed a three-dimensional model designed to better understand and help promote resilience, in which resilience was described as: a condition (i.e., presence of protective factors), a state (i.e., set of personal characteristics associated with

healthy development) and a practice (i.e., what caregivers and mentors can do to promote resilience). Studies looking at the effects of resilience interventions find promise in programs for a variety of age groups. For instance, research suggests that it is possible to promote resilience in children by teaching them better thinking and problem solving skills (Andrews, 2000, cited in Marzano & Heflebower, 2012). Other research shows that teaching resilience strategies (i.e., positive coping strategies) can foster self-efficacy, cognitive control and self-awareness in university students (Delany et al., 2015). Similarly, resilience training in the workplace has been shown to benefit employees on a number of positive outcomes such as well-being and performance indicators including lower stress, goal attainment and productivity (e.g., Grant et al., 2009; Pipe et al., 2012).

In short, resilience is sometimes studied as a predictor, a protective factor, a process or an outcome. Similarly, it can be defined as a set of internal characteristics that facilitates adaptation, an adaptive coping process, positive outcomes despite adversity, or the interactions of multiple internal and external factors. The lack of definitional consensus in the literature is reflected in these different conceptualizations of resilience. Table 1 presents a few examples of definitions to illustrate this variability.

Table 1: Examples of Various Definitions of Resilience

Categorization of Definition	Examples of Definitions per Categorization
Definitions of resilience integrating the role of context and external factors	• "represents the interaction between risk factors (vulnerability) and protected resources (protection)" (Ahern, Kiehl, Sole & Byers, 2006, p. 105) • "is both the capacity of individuals to navigate their way to health-sustaining resources, including opportunities to experience feelings of well-being, and a condition of the individual's family, community and culture to provide these health resources and experiences in culturally meaningful ways" (Ungar, 2008, p. 225)
Definitions associated with personal assets or coping process	• "any behavioral, attributional, or emotional response to an academic or social challenge that is positive and beneficial for development (such as seeking new strategies, putting forth greater effort, or solving conflicts peacefully)" (Yeager & Dweck, 2012, p. 303) • "the process of coping with disruptive, stressful, or challenging life events in a way that provides the individual with additional protective and coping skills than prior to the disruption that results from the event" (Richardson, Neiger, Jensen & Kumpfer, 1990, p. 34)
Definitions associated with positive outcomes	• "the ability to bounce back or recover from stress, to adapt to stressful circumstances, to not become ill despite significant adversity, and to function above the norm in spite of stress or adversity" (Smith et al., 2008, p. 194) • "good outcomes in spite of serious threats to adaptation or development" (Masten, 2001, p. 228)
Comprehensive definitions of resilience	• "a process of personal, interpersonal, and contextual protective mechanisms, resulting in an anomalous, positive outcome in the face of adversity" (Smith-Osborne & Bolton, 2013, p. 111) • "the process of negotiating, managing and adapting to significant sources of stress or trauma. Assets and resources within the individual, their life and environment facilitate this capacity for adaptation and 'bouncing back' in the face of adversity" (Windle et al., 2011, p. 2)

As Luthar, Cicchetti and Becker (2000) point out, while there are multiple ways of defining resilience, these divergent views may simply represent different facets of the same construct. Nonetheless, the lack of definitional consensus and the complex nature of resilience has led to the development of a wide range of

measures, each of them focusing on a set of dimensions and sub-dimensions designed to reflect the researcher's perspective on resilience.

In an effort to synthesize and organize the resilience-related constructs found in the literature, we developed a five-dimensional framework that is divided further into 13 sub-dimensions (see figure 1). The five general dimensions include:

a. Individual factors that are not subject to change by social policy;
b. External factors that can be viewed as antecedents or moderators of resilience-related variables;
c. Personal assets that facilitate the coping process necessary to achieve positive outcomes;
d. Coping process that focuses on strategies people use when faced with adversity; and
e. Desirable outcomes associated with resilience.

The small arrows running vertically in the centre of the figure represent a theoretical-causal link, whereas the arched arrows on the left side of the figure signify a moderating effect. A more detailed list of the sub-dimensions is included in Table 2. The framework shows that both external and internal factors play a role in fostering resilience. The discrepancy among definitions may be a reflection of the dynamic nature of resilience, that is, its fluctuation according to a person's specific circumstances, life stage and context. For instance, how we view successful adaptation to the PSE setting may be quite different from how we view it in the context of a chronic childhood illness. This suggests that circumstances and context may dictate to a large extent which skills and resources are needed to adapt effectively to a situation.

As highlighted in recent research, the need to foster resilience in postsecondary students appears well founded. Results of a 2012 survey at McMaster University show that about 35% of students reported feeling depressed and about 50% reported experiencing feelings of hopelessness and overwhelming anxiety (Craggs, 2012). Similarly, findings of a 2011 survey of students at the University of Alberta suggest that about half (51%) felt hopeless and over half felt overwhelming anxiety within the past 12 months (Lunau, 2012).

To determine how best to teach and assess resilience-related constructs in the educational context, it may be necessary to consider in greater depth the types of stressors or pressures students commonly encounter, and what students need to draw upon to be 'resilient.' For example, attrition and retention research indicates that stressors such as financial problems, academic difficulties, family responsibilities, personal problems and poor quality of teaching are linked to withdrawal from study (Willcoxson, Cotter & Joy, 2011). Viewed from this perspective, resilience would appear to represent a multidimensional construct involving the interplay between external and internal factors, where behaviours result in favorable outcomes they are characterized as 'resilient.' As such, it may not be possible to disentangle external factors from internal ones, since they likely interact with one another to shape positive adaptation. It may also be difficult to divorce external and internal factors from outcomes, since a resilient student may be described as someone who benefits from protective external factors and displays a combination of resilience-related skills and outcomes. For example, a student may be characterized as resilient if she (variously and in combination): (a) has had many opportunities to master leadership skills; (b) is self-motivated; (c) employs adaptive coping strategies; or (d) performs well academically.

Nonetheless, as shown in the framework (Figure 1), even if some underlying innate predispositions for resilience exist, several malleable personal factors and processes have been associated with resilience. This means that interventions or teaching practices could focus on students' development of personal strengths

or effective coping strategies to help them learn and develop more adaptive thought and behaviour patterns, which ultimately would increase their chances of academic success. In this way, resilience could be interpreted as one or more transferable skills, potentially to be acquired or enhanced as part of educational programs.

The five dimensions in Figure 1 could help guide the design of different types of interventions or teaching practices based on student needs, as well as help determine which tool is best suited to assess their effectiveness. Since the goal of this literature review was to identify measures that could assess resilience as a transferable skill and learning outcome of PSE, we focused on measures that assess malleable personal assets, coping strategies and outcomes.

Figure 1: Framework Outlining Dimensions and Subdimensions Associated with Resilience

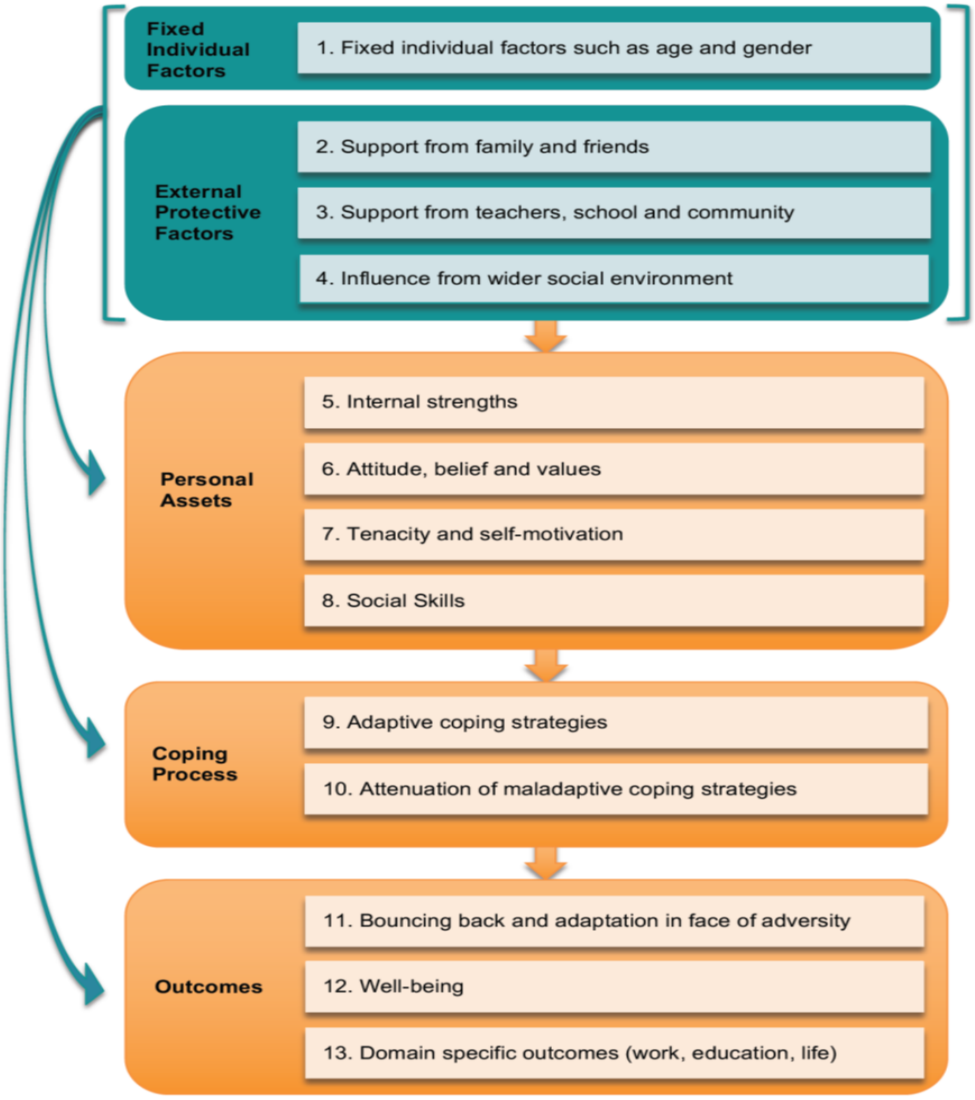


Table 2: Detailed List of the 13: Subdimensions Outlined in the Framework in Figure 1

General Dimension	Name of Subdimension	Examples
Fixed individual factors	1. Fixed individual factor	Age, gender, birth order
External protective factors	2. Support from family and friends	Feeling cared for by family, family atmosphere, family
	3. Support from teachers, school and the community	Support from teachers, feeling connected to school and community, having caring adults to turn to, involvement in extracurricular activities, opportunities for mastering skills (e.g., artistic skills, leadership and teamwork)
	4. Influence from wider social environment	Sociocultural factors, health resources and social integration
Personal assets	5. Internal strengths	Self-efficacy, self-concept, sense of self, self-esteem, belief in self, sense of mastery, internal locus of control, sense of autonomy, self-confidence, sense of identity, self-transcendence, capacity to anticipate and plan
	6. Attitudes, beliefs and values	Positive attitude, flexibility, optimism/positive future orientation, hope, humour, sense of purpose, spiritual perspective
	7. Tenacity and self-motivation	Persistence, determination, inner will, motivation
	8. Social skills	Capacity to form strong relationships, empathy and social responsiveness, cultural sensitivity, altruism
Coping process	9. Adaptive coping strategies	Cognitive restructuring of painful events, courageous coping, realistic appraisal of the environment, acceptance of responsibility, dissociation from intense emotions
	10. Attenuation of maladaptive coping strategies	Worrying, wishful thinking, ignoring the problem, escape, unwarranted self-blame, social isolation, helplessness, delegation, rumination, blaming other for the negative outcome
Outcomes	11. Bouncing back	Adaptation despite adversity
	12. Well-being	Satisfaction with life, subjective well-being
	13. Domain specific outcomes	Education, work, personal life

Note: The list of factors in the table is based primarily on the following articles: Ahern et al. (2006); Békaert, Masclet & Caron (2011); Hasse (2004); Hasse et al. (1999); Kanevsky et al. (2008); Mrazek & Mrazek (1987); Skinner et al. (2013); The Canada Millennium Scholarship Foundation (2007).

6. Measures of Resilience

In total, we identified over 47 measures designed to assess a variety of dimensions linked to resilience. In order to focus our attention on the most relevant measures for this project, we applied a series of selection criteria (see methodology). On the basis of these criteria, several scales were excluded from the review (see Appendix A).

After inspecting the measures or articles describing them, we chose 17 for further review. All of the retained measures were self-report scales that captured subjective or perceived resilience targeting older adolescents, young adults and adults. While other types of resilience measures exist, we judged them not ideal for general postsecondary student population assessments. For instance, objective indicators of resilience can be measured at the community level, including socioeconomic factors that support people's livelihoods, such as employment, positive social capital indicators and business performance (Noya & Clarence, 2009). Other methods used to assess resilience at the individual level include daily diaries, interviews, classroom observations and parental questionnaires.

In this section we provide a brief description of each of the measures, with an overview of their respective psychometric properties. The measures targeting older adolescents and young adults are described first in alphabetical order, followed by the ones targeting adults, also in alphabetical order. A list of the retained measures and the conceptual factors they embrace are presented in Table 3 (adolescents and young adults) and Table 4 (adults). The last column in each of these two tables maps the measures' conceptual categories to SRDC's framework, offering a quick glimpse of each measure's focus. The present review is meant to provide a broad overview of resilience measures used in the literature.

6.1 Retained Measures Targeting Older Adolescents and Young Adults

1. Adolescent Resilience Questionnaire (ARQ) (Gartland, Bond, Olsson, Buzwell & Sawyer, 2011).
The ARQ is an 88-item self-report measure developed to capture the comprehensive nature of resilience in adolescents. All items are rated on a five-point Likert scale ranging from 1 (never) to 5 (all the time), with higher scores indicating greater presence of resilience-related internal and external resources available to adolescents. Internal resources tap five personal assets, including confidence, emotional insight, negative cognition, social skills and empathy, whereas external resources include connectedness and support from family, peers, school and the community. The ARQ is comprised of 12 subscales nested into five domains: Self, Family, Peer, School and Community (subscales presented in Table 3). While the items are available in the validation study (Gartland et al., 2011), permission to use the scale must be obtained from the first author.[1]

Sample items include:

- "I think things through carefully before making decisions." (emotional insight)

1 The ARQ may be used at no cost, but users must sign a user agreement with the Murdoch Children's Research Institute (Personal communication with first author by email, October 11, 2015).

- "I can express my opinions when I am in a group." (social skills)
- "I am confident that I can handle whatever comes my way." (confidence in self and the future)

The ARQ was developed following an extensive literature review and focus groups with young people living with chronic illness (e.g., asthma, cystic fibrosis, diabetes) and members of chronic illness support groups in Australia. It was first piloted with a sample of 204 adolescents, including grade 9 students from Catholic secondary schools and 12- to 18-year-old adolescents with chronic illness recruited from support groups and hospital clinics (mean age = 14.9 years). It was then revised with a general population sample, including grade 7 and 9 students from 11 schools (n = 451; Mean age = 13.9 years).

Reliability: The internal consistency of the 12 subscales ranges from fair to very good (α = .64 to .88). No test-retest data are available.

Validity: Items from the "Individual domain" subscale (40 items) could be relevant as a learning outcome of postsecondary education. Data support a five-factor solution as a representation of the five life domains. Criterion validity was not assessed in the original scale development study. However, another study using this scale demonstrated with a sample of grade 12 students (n = 195) that the ARQ could predict psychological distress related to an upcoming externally assessed examination. In particular, results suggest that "freedom from negative cognitions" is an important protective factor against subjective stress and symptoms of depression, stress and anxiety (Robinson, Alexander & Gradisar, 2009).

2. Child and Youth Resilience Measure (CYRM-28) (Ungar & Liebenberg, 2009; 2011)
The CYRM-28 is a 28-item self-report measure developed as a culturally and contextually relevant measure of child and youth resilience, and it is designed to facilitate cross-cultural comparison of resilience-related outcomes. The measure assesses seven domains of resilience across four clusters: Individual, Relational, Community and Culture (domains/subscales are presented in Table 3). Items are rated on a five-point Likert scale ranging from 1 (not at all) to 5 (a lot), with higher scores indicating the presence of greater internal and external assets. The items are available in the validation article (Unger & Liebenberg, 2011).

Sample items include:

- "Do you strive to finish what you start?" (individual)
- "Do you think you are fun to be with?" (relational)

The measure was developed using a multi-method approach across 14 sites spread over 11 countries with samples of marginalized youth aged between 15 to 20 years (*Mean* age = 16). It was tested across the 14 sites using a sample of 1,451 youth who were facing significant risk factors (e.g., family breakdown, poverty, social or economic dislocation). The original 58-item version of the CYRM was then reduced to 28 items.

Reliability: Internal consistency of the CYRM-28 was reported for the full 28 items for each of the subpopulations (Cronbach alpha values ranged from .84 to .93). While these values are considered very good, they are likely inflated due to the large number of items included in the measure. Test-retest data are currently unavailable.

Validity: Despite the fact that the scale was developed with vulnerable populations, some of the items could potentially be applied to students as a learning outcome of postsecondary education (e.g., "Are you aware of your own strengths?"), but the measure includes items that are more appropriate for vulnerable

populations (e.g., "Do you eat enough most days?"). Overall, more validation evidence is needed to assess the construct and criterion validity of the CYRM-28.

3. College Resilience Questionnaire (CRQ) (Carlson, 2001)
The CRQ is a 27-item self-reported measure designed to assess resilience in college students defined as the ability to cope effectively with stress and adversity. The measure includes two dimensions: academic engagement and social engagement. Participants respond using a five-point Likert scale ranging from 1 (always false) to 5 (always true). Higher scores indicate an increased ability to handle adversity in either academic or social contexts. Items are available in Carlson's (2001) dissertation.

Sample items include:

- "I am very optimistic about my education." (academic engagement)
- "I am able to connect with others in college." (social engagement)

The measure was tested in the United States in three separate studies of undergraduate students (Study 1, n = 116 with Mean age = 20; Study 2, n = 235; Study 3, n = 143).

Reliability: The authors found the internal consistency of the CRQ to be robust across all three studies, with Cronbach alphas ranging from .77 to .95. Carlson also reported satisfactory test-retest reliability over a four-week period (r = .63), which by conventional standards would be considered fair.

Validity: The items seem relevant as a potential learning outcome of postsecondary education, particularly the 18 items included in the academic engagement subscale. Factor analysis supported the proposed two-factor solution. Convergent validity was also supported with such criterion variables as self-efficacy, mastery goals, anxiety and absences. Conversely, as anticipated, the CRQ was not related to prior knowledge about biology and social goals, supporting the discriminant validity of the measure. A positive correlation was found between the CRQ (measured at the beginning of the semester) and intent to return to college the following year (measured in the second half of the semester), providing some support for the predictive validity of the measure. Although the psychometric properties of the CRQ reported are respectable, the measure's application in other studies appears very limited.

4. Inventory of College Students' Resilience (ICSR) (Huang & Lin, 2013)
The ICSR is a 17-item self-report measure (20 items prior to the validation process) developed to measure resilience of Taiwanese college students. The measure includes four dimensions: 'Empathy and interpersonal interaction,' 'Cognitive maturity,' 'Problem solving,' and 'Hope and optimism.' Participants rate the items on the extent to which they agree with each statement using a five-point Likert scale ranging from 1 (almost never) to 5 (always true). Higher scores indicate a higher degree of resilience. Items are available in the validation article (Huang & Lin, 2013).

Sample items include:

- "To achieve my goals, I must do my best." (cognitive maturity)
- "I look for appropriate resources to apply to solve problems." (problem solving)

The scale was developed with a sample of 993 first- to fourth-year college students from six universities in Taiwan (Mean age = 22.6 years).

Reliability: The ICSR was found to have respectable to high internal consistency for each subscale, with alphas ranging from .73 to .90 across both samples. No test-retest data are available in the original scale development study.

Validity: While the five items in the empathy and interpersonal interaction subscale may be less relevant for HEQCO's objectives, the items from the other three subscales could potentially be interpreted as learning outcomes from postsecondary education. Exploratory and confirmatory analyses supported the four-factor model and gender invariance. In addition, the four subscales of the ICSR significantly and positively correlated with students' life adaptation, supporting the convergent validity. Although psychometric properties of this scale are generally sound, it was not clear whether or not the items have been tested or used with an Anglophone sample. To our knowledge, this scale has only been investigated with Taiwanese students and may not generalize to North American populations.

5. Resiliency Attitudes and Skills Profile (RASP) (Hurtes & Allen, 2001)
The RASP is a 34-item self-report measure developed to assess resiliency in youth for recreation and other social services providing interventions. Although the terms 'resilience' and 'resiliency' have sometimes been used interchangeably, Luthar et al. (2000) argue that 'resilience' should be used to describe the process of overcoming adversity, and 'resiliency' used to refer to personality traits that buffer against the effect of stress. This distinction is reflected in the RASP's seven personal-level dimensions: Insight, Independence, Creativity, Humour, Initiative, Relationships and Values orientation. During the validation process two response formats were used. In the first version, participants rated their responses on a four-point scale ranging from 1 (disagree) to 4 (strongly agree), whereas in the second, the response options were expanded to a six-point scale where 1 = disagree and 6 = strongly agree. Items are available in the validation article (Hurtes & Allen, 2001).

Sample items include:

- "I try to figure out things I do not understand." (initiative)
- "I learn from my mistakes." (insight)

This measure was developed with two samples of youth in the United States. The first consisted of 274 youth aged 12 to 19 years participating in a summer program (48% were African-American and 37% were of Haitian descent). The second sample was comprised of 190 youth aged 12 to 17 years, participating in a series therapeutic wilderness camps (i.e., Eckerd Youth Alternatives; EYA).

Reliability: Internal consistency of the overall scale was high (alpha = 0.91). However, the alpha coefficients for the seven subscales were much lower, ranging from .49 to .71. A five-day test-retest coefficient for overall measure of .94 was reported, suggesting a good temporal stability.

Validity: Most items included in the RASP seem to be appropriate for postsecondary students. This measure includes a number of resilience-related dimensions that could serve in a measure of learning outcomes of postsecondary education. Confirmatory Factor Analyses performed to test the factorial structure of the RASP did not fully support the seven-factor structure with either of the two samples. However, there was support for the measure's convergent validity, such that the RASP significantly correlated in the expected direction with the two subscales of the Mental Health Index (i.e., psychological well-being and psychological distress). Based on their findings, Hurtes and Allen (2001) advise against using the tool with youth who are

not developmentally capable of understanding the items, but conclude that it could be useful to assess the resilient functioning of a more general adult population.

6. Resilience Youth Development Module (RYDM) (Furlong, Ritchey & O'Brennan, 2009)
The 56-item version of the RYDM has undergone several changes since 2000. For this report, we reviewed the 26-item self-report measure for the secondary school (Furlong et al., 2009) contained in the California Healthy Kids Survey (CHKS) for practicing school psychologists. It was designed to measure internal and external resources thought to serve as protective factors among youth. The internal resource subscales include four areas of personal strength: Self-efficacy, Empathy, Problem solving and Self-awareness, which can also be reported as a combined 'internal assets' score. Another two subscales assess external resources: School support and School meaningful participation. Participants rate the extent to which the statements are true about them personally using a four-point Likert scale ranging from 1 (not at all) to 4 (very much true). Items are available in the validation study (Furlong et al., 2009).

Sample items include:

- "I can work out my problems." (self-efficacy)
- "When I need help, I find someone to talk with." (problem solving)
- "There is a purpose to my life." (self-awareness)

This measure was originally developed as a population-based survey in California, but has increasingly been used as a way to assess student-level change. To enable interpretation of the scores at the individual level, Furlong and his colleagues (2009) have recently developed normative data, including grade, ethnicity and gender patterns. The items selected for this study were based on a thorough investigation of the psychometric properties of the measure (Hanson & Kim, 2007). To develop norms, Furlong and colleagues used a sample of 141,004 students spread almost equally across grades 7, 9 and 11. The sample included 55% female and several ethnic groups with the majority of students identifying as either Hispanic (37%) or White (30%).

Reliability: Internal consistency of the subscales shows moderate to high reliabilities ranging from .69 to .93 in the norm development study (Furlong et al., 2009), and was always above .70 in a previous study (Hanson & Kim, 2007). However, the RYDM scales yield low test-retest reliability with a two-week interval, with values below .60, suggesting that it may not be well suited to examine student-level change over time.

Validity: The internal asset subscales of the RYDM cover a number of relevant dimensions that could be construed as learning outcomes of postsecondary education. Previous studies provided support for the psychometric properties of the school level RYDM (Hanson & Kim, 2007). The RYDM also demonstrates measurement invariance across ethnic groups, gender and grades. Hanson and Kim (2007; Table B10) found support for a four-factor solution for internal assets (after dropping four items of the original scale) and a two-factor solution for school external assets. The subscales have been shown to correlate positively with higher Academic Performance Index (API) rankings (Hanson & Austin, 2002) and student engagement (Sharkey, You & Schnoebelen, 2008).

7. Resiliency Scale (RS) (Jew, Green & Kroger, 1999)
The final version of the RS is a 35-item self-report measure designed to assess skills and abilities that resilient people use in stressful situations. Eleven of the 12 hypothesized skills and abilities are represented in three subscales: Future orientation, Active skill acquisition and Independence/Risk taking. Items are rated

on a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). Partial items are presented in the validation article (Jew et al., 1999).[2]

Sample items include:

- "I have future goals." (future orientation)
- "If don't know, ask." (active skill acquisition)
- "Take risks I shouldn't." (independence/risk taking)

The development and validation article of this measure contains four studies using different student samples from grade 7 to grade 12 in the western states and a sample of students from an adolescent psychiatric treatment facility (mean age = 15 years). The four studies describe the scale refinement and reduction from 109 to 35 items, moving from a 12- to a three-factor measure.

Reliability: Results of Study 4 show that the subscales possess fair to very good internal consistency, with Cronbach alphas ranging from .68 to .95. The 23-week interval test-retest reliability assessment revealed weak to adequate values (correlations ranging from .36 to .57).

Validity: Several items focus on how students deal with stressful situations, which seems appropriate for a potential measure of learning outcomes of postsecondary education. Scores from the 35 items retained supported a three-factor solution representing 11 of the 12 hypothesized abilities and skills associated with resilient people. The optimism and active skill acquisition subscales correlated modestly in the expected direction, with criterion variables such as achievement, self-perception, locus of control and coping providing some support for the convergence validity. In addition, the independence subscale could differentiate institutionalized from non-institutionalized adolescents. Lower scores on the overall RS were associated with reported at-risk indicators providing further support for the construct validity. Findings would need to be extended to other samples to ensure they could be generalized to Canadian postsecondary students.

8. Resiliency Scales for Children & Adolescents (RSCA) (Prince-Embury, 2008)[3]
The RSCA is a 64-item self-report measure developed to tap three underlying systems of resiliency in children or adolescents aged 9-18 years. Items of the scale have been grouped in three dimensions which represent each of the systems of resiliency: Sense of Mastery, Sense of Relatedness and Emotional Reactivity. The three global scales are subdivided into 10 subscales (see Table 3 for a list of subscales). Responses are rated on a five-point scale ranging from 0 (never) to 4 (almost always). The RSCA is copyrighted and can be accessed commercially from Pearson Assessment.

For the purpose of the review, we report findings as they relate to the adolescents aged 15-18 years. The scales were tested with 200 adolescents selected from a larger pool of the adolescent community sample. A

2 Attempts have been made to obtain a copy of the final version of the RS by email from the first author (October 14, 2015). The author has not yet sent the scale.
3 This scale was recently modified and tested with young adults in Canada (Saklofske et al., 2013). A request for more information on the scale and its validation was sent out by email to the first authors (Personal communication by email, October 14, 2015). Dr. Prince-Embury informed us that Pearson Assessments owns copyright for the RSCA and the RSYA as a derivative product and therefore holds all rights for distribution of the actual scale.

stratified sampling plan was used based on U.S. Bureau of the Census (2003) guidelines to ensure that the standardization sample accurately represented demographic subgroups. *T*-scores have been calculated for each of the global scales to generate a Personal Resilience Profile, providing benchmarks against which an adolescent's strengths and vulnerabilities can be compared. The scales can be combined in different ways to create different indices (i.e., Index scores, Resource Index and the Vulnerability Index).

Reliability: Results demonstrate that the three general scales achieved strong internal consistency, with Cronbach alpha coefficients ranging from .94 to .95. It is worth noting that the alpha coefficients were likely inflated due to the large number of items included within each of the scales. Test-retest reliability coefficients for a two-week interval were good for each of the general scales, ranging from .86 to .88. Results were not reported for the individual 10 subscales.

Validity: Based on the description of the items and the sample items provided in the article, this measure appears appropriate as a possible means of assessing learning outcomes of postsecondary education. Results also support a three-factor structure in line with the three theorized underlying systems of resiliency. The Sense of Mastery and the Sense of Relatedness scales have been significantly positively correlated with measures of self-esteem, demonstrating support for the convergent validity. In addition, the Emotional Reactivity Scale was found to be associated with anxiety, disruptive behaviour, depression and anger in non-clinical adolescents. The RSCA Vulnerability Index also discriminates between clinical versus non-clinical samples.

Table 3: Operationalization of Resilience of Retained Measures that Target Older Adolescents or Young Adults (College Students)

Name of Measure (First Author, Year) and Number of Items	Conceptual Factors and Subscales	Mapping to SRDC Framework
Adolescent Resilience Questionnaire (ARQ) (Gartland, 2011) 74 items	**5 factors: self, family peers, school and community (including 12 subscales)**	
	1. Negative cognitions	Asset/Coping
	2. Emotional insight	Asset/Coping
	3. Empathy	Asset
	4. Social skills	Asset/Coping
	5. Confidence in self and the future	Asset
	6. Family connectedness	External
	7. Family availability	External
	8. Peer connectedness	External
	9. Peer availability	External
	10. School supportive environment	External
	11. School connectedness	External
	12. Community connectedness	External
Child and Youth Resilience Measure (CYRM-28) (Ungar, 2011) 28 items	**4 factors: Individual, relational and contextual and culture, including 7 subscales**	
	1. Access to material resources	External
	2. Relationships	External
	3. Identity	Asset
	4. Power and control	Asset/Coping
	5. Cultural adherence	Coping
	6. Social justice	External/Coping
	7. Cohesion	Asset/Coping

Name of Measure (First Author, Year) and Number of Items	Conceptual Factors and Subscales	Mapping to SRDC Framework
College Resilience Questionnaire (CRQ) (Carlson, 2001) 27 items	**2 Factors**	
	1. Academic engagement	Asset/Coping
	2. Social engagement	Asset/Coping
Inventory of College Students' Resilience (ICSR) (Huang & Lin, 2013) 17 items	**4 factors**	
	1. Empathy and interpersonal interaction	Asset
	2. Cognitive maturity	Asset
	3. Problem solving	Coping
	4. Hope and optimism	Asset
Resiliency Attitudes and Skills Profile (RASP)** (Hurtes, 2001) 34 items	**7 factors**	
	1. Insight	Asset
	2. Independence	Asset
	3. Creativity	Asset
	4. Humour	Asset
	5. Initiative	Asset/Coping
	6. Relationships	Asset
	7. Values orientation	Asset
Resilience Youth Development Module (RYDM) of the California Healthy Kids Survey (Furlong, 2009) 56 items	**6 factors (4 internal and 2 external assets)**	
	1. Self-efficacy	Asset
	2. Empathy	Asset
	3. Problem solving	Coping
	4. Self-awareness	Asset/Coping
	5. School supports	External
	6. Meaningful school participation	External

Name of Measure (First Author, Year) and Number of Items	Conceptual Factors and Subscales	Mapping to SRDC Framework
Resiliency Scale (RS) (Jew, 1999) 35 items	**3 Factors**	
	1. Future orientation	Asset
	2. Active skill acquisition	Asset/Coping
	3. Independence/risk-taking	Asset/Coping
Resiliency Scales for Children & Adolescents (RSCA)** (Prince-Embury, 2008) 64 items	**3 factors (10 subscales)**	
	1. Sense of mastery scale (optimism, self-efficacy and adaptability)	Asset
	2. Sense of relatedness scale (comfort in others, trust in others, perceived access to support by others and capacity to tolerate differences in others)	Asset/External
	3. Emotional reactivity scale (sensitivity for and intensity of reaction, recovery time and impairment while upset)	Asset/Coping/ Outcome

6.2 Retained Measures Targeting Adults

9. Baruth Protective Factors Inventory (BPFI) (Baruth & Carroll, 2002)
The BPFI is a 16-item self-report measure designed to assess four primary protective factors that contribute to resilience. It includes four dimensions: Adaptable personality, Supportive environment, Fewer stressors and Compensating experiences. Participants rate their responses on the extent to which they agree with the statements on a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). Items are available in the original scale validation article, but the item-to-dimension correspondence is not indicated (Baruth & Carroll, 2002).

Sample items include:

- "I feel that I have coped well with one or more major stressors in my life."
- "I feel I am optimistic and concentrate on the positive in most situations."

The measure was validated using a sample of 98 undergraduate students at a southwestern university in the United States. Participants' ages ranged from 19 to 54 years, with the majority of participants reporting being under 30 years old (96%). The sample was mostly female (80.6%), and with respect to ethnicity, the majority of participants identified as Hispanic American (n = 38.1%) or Anglo American (11.3%).

Reliability: Results indicate a good internal consistency for the overall scale (alpha = .83), but alpha coefficients ranged widely for the four individual scales (from .55 to .95). Of note, the Fewer stressors subscale was the only one that did not reach .70. No test-retest data were presented in the validation study.

Validity: The items of the adaptable personality and the compensating experiences subscales could be

construed as learning outcomes of postsecondary education. However, the measure includes double-barreled items (in other words, combined questions in a single item for which respondents can only give one answer). Adequate convergent validity of the measure was demonstrated with significant correlations in the expected direction between the subscales of BPFI and other established measures. No other analyses were conducted to support the validity of the BPFI, and the authors recognized that further testing would be necessary to determine whether or not the measure adequately reflected the resilience construct. In addition, this measure appears to have received limited attention in published works.

10. Brief-Resilient Coping Scale (BRCS) (Sinclair & Wallston, 2004)
The BRCS is a four-item scale designed to assess resilient coping behaviours as a unidimensional construct. Participants respond by indicating how well each of the statements described their behaviour and actions on a five-point Likert scale ranging from 1 (the statement does not describe you) to 5 (the statement describes you very well).

The 4 items are the following:

- "I actively look for ways to replace the losses I encounter in life."
- "I believe that I can grow in positive ways by dealing with difficult situations."
- "I look for creative ways to alter difficult situations."
- "Regardless of what happens to me, I believe I can control my reaction to it."

The measure was developed with two samples of adults with rheumatoid arthritis in the United States. The first sample comprised 90 females with a mean age of 46 years, and the second included 149 participants (73% female) with a mean age of 57.8 years. The first author developed the items and doctoral nurses assisted in selecting nine items for further analysis. After subjecting the items to an exploratory principal components analysis, four items that loaded cleanly on one factor were retained.[4]

Reliability: The BRCS displays fair to adequate internal consistency, with Cronbach alphas ranging from .64 to .71, and adequate test-retest reliability over a five- to six-week period (r = .71).

Validity: Although the measure was developed for adults with rheumatoid arthritis, the non-specific formulation of the items lends itself well to other populations or contexts. The BRCS demonstrates adequate convergent validity, as evidenced from its moderate to strong correlations with several well-established measures of personal coping resources, pain coping behaviours and psychological well-being. The results also showed that the BRCS did not significantly correlate with unrelated constructs such as age, employment status or length of time since diagnosis, supporting its discriminant validity. In addition, in the context of an intervention designed to enhance resilience/coping, pre-intervention BRCS scores were shown to predict post-intervention outcomes. Overall, this measure demonstrated good psychometric properties, but its application to postsecondary populations may need to be tested.

4 According to the first author, the scale has recently been used in a Spanish sample, with results published in Spanish. In addition, the scale has been used in a community study of over 7,000 twins run by the University of Washington. The Cronbach alpha in that large sample was .75. The author informed SRDC that they were in the process of publishing several articles from that sample's data (Personal communication, October 22, 2015).

11. Brief Resilience Scale (**BRS**) (Smith et al., 2008)
The BRS is a six-item self-report measure developed to assess the ability to bounce back and recover from stress. The items converge together to form a single dimension. Participants respond by indicating the extent to which they agree with each of the statements using a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree).

Sample items include:

- "I tend to bounce back quickly after hard times."
- "I have a hard time making it through stressful events." (reverse coded)

The psychometric properties of the BRS were examined with four different samples recruited in the southwestern United States. Sample 1 (n = 128) and Sample 2 (n = 64) included undergraduate students, Sample 3 consisted of cardiac patients (n = 112), and Sample 4 included women with fibromyalgia (n = 20) and healthy women who served as a comparison group (n = 30).

Reliability: Results indicate that the BRS has good internal consistency, with Cronbach alphas ranging from .80 to .90. In addition, test-retest reliability coefficients using ICCs for a two-week interval were fair, ranging from .61 to .69.

Validity: The items were tested on undergraduate students, demonstrating its applicability in the university context.[5] The BRS is one of the few measures to target directly the assessment of resilience rather than the factors and resources that contribute to its manifestations. Results of the principal component analysis (PCA) supported the one-factor solution. In addition, the BRS correlated strongly with a number of other measures in the expected direction for each sample, including measures of personal characteristics, social relations, coping and health outcomes. The BRS was found significantly and positively related to other measures of resilience, such as the Connor-Davidson Resilience Scale (r =.59 for Sample 1) and the Ego Resiliency Scale (r = .51 for Sample 1 and r = .49 for Sample 4). Significant partial correlations between the BRS and health outcomes for cardiac patients (such as perceived stress, anxiety, depression, negative affect and fatigue), while controlling for the other resilience measures and other resilience-related constructs, suggest that the BRS explained unique variance in these outcomes. BRS scores also differentiated between cardiac patients with and without Type D, as well as women with and without fibromyalgia.

12. Connor-Davidson Resilience Scale (CD-RISC) (Connor & Davidson, 2003)
The original version of the CD-RISC is a 25-item self-report measure developed for clinical practice as a measure of stress coping ability. The items have been grouped into five broad dimensions: (1) Personal competence, high standards and tenacity, (2) Trust in one's instinct, tolerance of negative effects, strengthening effects of stress, (3) Acceptance of change and secure relationships, (4) Control, and (5) Spiritual influences. Items are rated based on how the participant has felt over the past month on a five-point Likert scale ranging from 0 (not at all true*)* to 4 (true nearly all the time), with higher scores

5 According to the first author of the scale, his research has shown that the BRS is appropriate to use with postsecondary students and is sensitive to student-level changes. The author also mentioned that the BRS can be used free of charge and provided SRDC with a chapter (Smith, Epstein, Ortiz, Christopher & Tooley, 2013) that suggests cut-offs for high (above 4.3) and low (below 3.0) resilience scores (Personal communication, December 6, 2015).

representing greater resilience. Items are available in the original validation article (Connor & Davidson, 2003).

Sample items include:

- "You work to attain your goals." (personal competence, high standards and tenacity)
- "Have to act on a hunch." (trust in one's instinct)
- "Can deal with whatever comes." (acceptance of change)
- "In control of your life." (control)
- "Sometimes fate or God can help." (spiritual influences)

The CD-RISC was developed and validated using a general non-clinical group (n = 577) and four additional clinical groups in the United States, including patients who experience anxiety, depression, psychiatric symptoms and posttraumatic stress (n = 229). An additional 22 participants served to test the pre- and post-treatment change. Combined, the samples primarily included females (65%) and Caucasians (77%). Participants' mean age was 43.8 years.

Reliability: The original scale development and validation study demonstrated that the CD-RISC possessed good reliability. The overall scale yielded a high internal consistency (α = 0.89) and the test-retest reliability indicated an ICC coefficient of .87. As mentioned previously, high reliability values can be due to the large number of items included in the overall scale.

Validity: The items appear to reflect several personal assets and coping skills that have been linked to resilience and could potentially serve to measure the learning outcomes of postsecondary education. Exploratory factor analysis (EFA) revealed five factors with strong loading, but the results also presented cross-loadings suggesting a possible unstable factorial structure. In fact, confirmatory factor analysis of the Chinese version of the CD-RISC only yielded a three-factors solution interpreted as tenacity, strength and optimism (Yu & Zhang, 2007). Work by Campbell-Sills and Stein (2007) also found the factor structure of the CD-RISC to be unstable, which led to the development of a 10-item version of the scale. The original CD-RISC did however demonstrate good convergent and divergent validity. It was strongly correlated in the expected direction with a number of resilience-related measures including hardiness, perceived stress, perceived stress vulnerability, disability and social support. Finally, results indicated that the CD-RISC scores were sensitive to the effects of treatment.

13. Connor-Davidson Resilience Scale (CD-RISC-10) (Campbell-Sills & Stein, 2007)[6]
The CD-RISC-10 is a 10-item abridged version of the CD-RISC. All items are drawn from the original scale and reflect a single resilience factor interpreted and labeled as Hardiness and persistence. Items are available in the validation article (Campbell-Sills & Stein, 2007).

6 The first author of the scale told SRDC the CD-RISC-10 would likely be a good measure to use to assess resilience as a learning outcome of PSE but was unsure whether it would be sensitive to change. In their study, resilience was only assessed at one point in time. The author also mentioned that to use the scale, HEQCO should contact Jonathan Davidson since he holds the copyright to all versions of the CD-RISC.

Sample items include:

- "Able to adapt to change."
- "Can achieve goals despite obstacles."

This abridged version was tested with a potential pool of undergraduate students from San Diego State University (n = 1,743). The sample primarily comprised females (74.4%). Participants self-identified as Caucasian (53.1%) and Hispanic (13.4%). The mean age of the entire sample was 18.8 years. Sub-samples of this pool of participants were used to test different hypotheses, namely, testing the factor structure of the original 25-item scale using EFA, testing the abridged version using EFA and confirming the factor structure of the abridged version using confirmatory factor analysis (CFA). A subsample of comparable participants was also used to test the construct validity by examining whether or not resilience moderated the relationship between childhood maltreatment and psychiatric symptoms.

Reliability: The results reveal that the CD-RISC-10 had good internal consistency, with a Cronbach alpha of .85. Test-retest analyses were not performed.

Validity: The 10 retained items of the CD-RISC-10 seem relevant to HEQCO's objectives. Two coherent factors labeled hardiness and persistence emerged from the EFAs conducted with 13 of the items, but the correlation between the two factors was very high. Therefore, three redundant items were discarded and all 10 remaining items were converged into one factor, interpreted as the ability to tolerate challenging experiences and to bounce back from them when they arise. The high correlation between the CD-RISC-10 and the original version (r = .92) provides support for the convergence/concurrent validity. The findings also demonstrate that the CD-RISC-10 scores discriminated between high and low resilience, and suggest that strong resilience was a protective factor against the effect of high childhood maltreatment.

14. Connor-Davidson Resilience Scale (CD-RISC2) (Vaishnavi, Connor & Davidson, 2007)
The CD-RISC2 is a two-item abridged version of the CD-RISC designed to represent the ability to spring back and adapt successfully to change.

The two items are the following:

- "Able to adapt to change."
- "Tend to bounce back after illness or hardship."

This version was tested on several samples of clinical patients (total n = 386) as well as a sample of the general population (n = 458).

Reliability and Validity: The data suggest good test-retest reliability (ICC = .86) and good convergent validity as evidenced from the significant correlations between the CD-RISC2 and the same measures used in the original CD-RISC validation, including the remaining 23 items of the CD-RISC (Connor & Davidson, 2003). Divergent validity was also supported with the absence of significant correlation between the CD-RISC2 and a construct unrelated to resilience (i.e., Arizona Sexual Experience Scale). Findings also showed that this short two-item measure could predict clinical changes, such that patients who improved also showed improvements in their CD-RISC2 score. Finally, the CD-RISC2 scores differentiated between clinical patients and the general population group. Vaishnavi and colleagues (2007) argued that based on the psychometric properties of the measure, this two-item version could be used to replace its longer predecessor.

15. Psychological Resilience (Windle, Markland & Wood, 2008)
The Psychological Resilience scale is a 19-item self-report measure designed to examine the psychological aspects of resilience in older age, where it is presumed to serve as a protective factor against stress and adversity. The measure covers three dimensions: Self-esteem, Personal competence and Interpersonal control. Items for the self-esteem dimension were drawn from Rosenberg's (1965) Self-Esteem Scale and were rated on five-point Likert scale ranging from 1 (strongly agree) to 5 (strongly disagree). Items for the personal competence dimension were derived from Wagnild and Young's (1993) Resilience Scale and were rated on a seven-point Likert scale ranging from 1 (strongly disagree) to 7 (strongly agree). Finally, items for the Interpersonal control dimensions were drawn from Paulus and Christie's (1981) Spheres of Control scales and were rated on a seven-point Likert scale ranging from strongly agree to strongly disagree. Partial items are available in the validation article (Windle et al., 2008).

Sample items include:

- "I have a number of good qualities." (self-esteem)
- "Persevere with plans." (personal competence)
- "No trouble making and keeping friends." (interpersonal control)

The measure was tested with a large sample of older adults in the UK (England, Scotland and Wales). The sample included 1,853 participants (45% men and 55% women) with a mean age of 65.86 years.

Reliability: Internal consistency was found to be good, with Cronbach alphas ranging from .80 to .84. Test-retest reliability was not evaluated in this study.

Validity: Although the items were tested on older adults, they were drawn from well-established measures used with younger populations. The three dimensions appear to tap assets or coping skills, which may be relevant as an assessment of learning outcomes from postsecondary education. The factorial structure was tested with half of the sample and adequately replicated with the second half, providing support for the construct validity of the measure. Criterion related validity was not tested in this study. Further validation of this measure would be needed to determine how it relates to positive outcomes for postsecondary students.

16. Resilience Scale (RS-25) (Wagnild & Young, 1993)[7]
The RS-25 is a 25-item self-report measure designed to assess positive personal attributes related to resilience. It was developed to reflect five components of resilience: Perseverance, Equanimity, Meaningfulness, Self-reliance and Existential aloneness. Principal component analysis suggested two overarching factors, which were interpreted and labeled as Personal competence and Acceptance of self and life. Items are rated on a seven-point Likert scale ranging from 1 (disagree) to 7 (agree). A 14-item abridged version of this measure (RS-14) is also available and its psychometric properties can be found in the user's guide (Wagnild, 2009a). There is a copyright on this measure and a license must be obtained to use it. The

7 According to the first author, the RS-25 has recently been updated and improved based on feedback and data from thousands of uses of the measure. The new measure is called the True Resilience Scale and can be completed online at the following link: www.resiliencescale.com (Personal communication by email, October 5, 2015).

following website may be consulted for additional information:
http://www.resiliencescale.com/shop/resilience-scale-license-pack-for-researchers/

Sample items from the original RS-25 include:

- "I am determined." (personal competence)
- "I usually take things in stride." (acceptance of self and life)

The Resilience Scale was first developed as part of a qualitative study of resilience in older woman living in a community in the Northwestern United States (n = 810; age ranged from 53-95 years). The five dimensions were derived from the qualitative data and the initial 50 items were reduced down to 25. The scale has been validated and used in a number of studies with a variety of age groups in different contexts, including undergraduate and graduate students (Wagnild, 2009b). Data ranges have been proposed to categorize scores as low, medium and high resilience.

Reliability: Internal consistency reported in several small studies in the early 1990s was consistently adequate to high, with Cronbach alpha coefficients ranging from .73 to .91 (Wagnild, 2009b). Test-retest reliability at four-month intervals with pregnant and post-partum women (n = 130) revealed acceptable temporal stability with correlations ranging from .67 to 84.

Validity: Although items were developed based on older women's qualitative data, the items have been tested with younger populations, making it appropriate for postsecondary students. The measure has been significantly positively associated with a number of well-being indicators, such as morale, self-esteem and life satisfaction, and has been significantly negatively linked to depression and perceived stress (Wagnild, 2009b). RS-25 scores also appear to be sensitive to individual-level change. For example, scores on the measure were shown to increase following an intervention designed to promote resilience in high-risk adolescents (Hunter & Chandler, 1999). This measure has been translated in several languages and has been extensively used in the literature (Wagnild, 2009b).

17. Resilience Scale for Adults (RSA) (Friborg, Barlaug, Martinussen, Rosenvinge & Hjemdal, 2005)
The original version of the RSA (Friborg, Hjemdal, Rosenvinge & Martinussen, 2003) was a 37-item measure designed to assess intrapersonal and interpersonal protective resources presumed to contribute to adult resilience. It covered five dimensions: Personal competence, Social competence, Family coherence, Social support and Personal structure. The items are rated on a five-point Likert scale format. This version of the RSA was validated with a sample of patients from an outpatient clinic in Norway (n = 59) and normal controls (n = 227). The subscales of the RSA were found to have adequate internal consistency (alpha coefficients ranging from .67 to .90) and adequate test-retest reliability (correlations ranging from .69 to .84). As expected, the subscales of the RSA correlated positively with a similar valid measure of overall mental health (i.e., sense of coherence) and negatively with a measure of psychiatric/affective symptoms (i.e., The Hopkins Symptom Check List-25). Finally, findings showed that the RSA subscales could differentiate between patient and healthy samples.

A newer 33-item version of that measure containing six dimensions was later created (Friborg et al., 2005). The initial personal competence subscale was found to have two underlying factors and was therefore divided into two separate dimensions labeled: Perception of self and Planned future. The remaining four dimensions were renamed: Social competence, Structured style, Family cohesion and Social resources. The response format was changed from a five-point Likert scale to a five-point semantic differential scale format,

in which each item has a positive and a negative attribute at the end of the scale continuum. The change in format was designed to reduce acquiescence bias, that is, the propensity to respond positively to items irrespective of their content. Items of the scale using the semantic differential scale format are available in the validation article (Friborg et al., 2005).

Sample items using the semantic differential scale format include:

- "My personal problems: are unsolvable _ _ _ _ _ I know how to solve."
- "I feel that my future looks: very promising _ _ _ _ _ uncertain."

The 33-item version was tested with a sample of 482 applicants to a military college (mean age = 24 years) which was primarily comprised of males (83.6%).

Reliability: The internal consistency of the 33-item RSA was adequate for all subscales, with Cronbach alphas ranging from .76 to .87. Test-retest was not evaluated in this study.

Validity: The intrapersonal items represented by four of the six subscales of the 33-item RSA included a number of personal assets associated with resilience, which could potentially serve to assess learning outcomes of postsecondary education. The factor structure was revised to a six-factor solution using structural equation modeling. Results found support for convergent and divergent validity. First, the subscales, and in particular the perception of self-subscale, correlated as expected with the Big 5 Personality factors (i.e., extraversion, agreeableness, conscientiousness, emotional stability and openness). Conversely and as anticipated, the RSA subscales were not significantly associated with intelligence factors (i.e., Raven's Advanced Matrices, mathematics, vocabulary and number series). The RSA has been adapted for use in different languages, including Turkish, Italian, French, Spanish and Chinese.

Table 4: Operationalization of Resilience in Retained Measures that Target Adults

	Name of Measure (First Author, Year) and Number of Items	Conceptual Factors and Subscales	Mapping to SRDC Framework
9.	**Baruth Protective Factors Inventory (BPFI)** (Baruth, 2002) 16 items	**4 factors**	
		1. Adaptable personality	Asset
		2. Supportive environment	External
		3. Fewer stressors	External
		4. Compensating experiences	Asset
10.	**Brief Resilient Coping Scale (BRCS)** (Sinclair, 2004) 4 items	**1 factor**	
		1. Adaptive coping	Coping
11.	**Brief Resilience Scale (BRS)**** (Smith, 2008) 6 items	**1 factor**	
		1. Ability to bounce back	Outcome
12.	**Connor-Davidson Resilience Scale (CD-RISC)** (Connor, 2003) 25 items	**5 factors**:	
		1. Personal competence, high standards and tenacity	Asset
		2. Trust in one's instinct, tolerance of negative effects, strengthening effects of stress	Asset
		3. Acceptance of change and secure relationships	Coping/External
		4. Control	Asset
		5. Spiritual influences	Asset
13.	**Connor-Davidson Resilience Scale (CD-RISC-10)**** (Campbell-Sills, 2007) 10 items	**1 factor:**	
		1. Hardiness and persistence	Asset/Outcome
14.	**Connor-Davidson Resilience Scale (CD-RISC2)**** (Vaishnavi, 2007) 2 items	**1 factor:**	
		1. Bouncing back and adaptability	Outcome

	Name of Measure (First Author, Year) and Number of Items	Conceptual Factors and Subscales	Mapping to SRDC Framework
15.	**Psychological Resilience** (Windle, 2008) 19 items	**3 factors**	
		1. Self-esteem	Asset
		2. Personal competence	Asset
		3. Interpersonal control	Asset
16.	**Resilience Scale (RS-25)**** (Wagnild, 1993) 25 items	**5 factors**	
		1. Perseverance	Asset/Coping
		2. Equanimity	Asset/Coping
		3. Meaningfulness	Asset/Coping
		4. Self-reliance	Asset/Coping
		5. Existential aloneness	Asset/Coping
17.	**Resilience Scale for Adults (RSA)** (Friborg, 2005) 33 items	**6 factors**	
		1. Perception of self	Asset
		2. Perception of future	Asset
		3. Structured style	Asset/Coping
		4. Social competence	Asset
		5. Family cohesion	External
		6. Social resources	External

7. Summary of Resilience Measures

In the following summary, we outline some of the key characteristics of the 17 retained measures and comment briefly on their overall quality. A table summarizing the reliability, validity and sample information of each of the measures is presented in Table C1 in Appendix C.

7.1 Key Characteristics of the 17 Retained Measures

- All retained measures are self-report assessments of resilience and all but one are rated by the participants using a four- to seven-point Likert scale. Unlike the other measures, the RSA uses a semantic differential scale format, which is thought to reduce acquiescence bias (Friborg et al.,

2005). Our findings attest to the popularity of self-report measures to assess resilience. Self-report methods are often considered to be the most appropriate to measure constructs that tap self-perception, attitudes or beliefs, such as self-efficacy, perceived stress or life satisfaction (Paulhus & Vazire, 2007). They also have the advantage of being efficient and inexpensive to administer in large-scale assessments. However, they can be prone to response biases, especially when participants are concerned with self-presentation, for example when responding to a skills assessment questionnaire to obtain a job. It is less likely to be problematic in the educational context if resilience measures are to be used for PSE quality assessment and accountability purposes and not as a way of evaluating performance at the student level.

- The measures vary in length, ranging from two to 88 items. They have been conceptualized as one to seven dimensions, with ten of them excluding the role of external factors.
- As shown in Tables 3 and 4, some measures reflect the complexity of the construct by including a wide spectrum of factors to operationalize resilience, including external factors, personal assets and the coping process (e.g., CYRM-28 and ARQ), while others focus almost exclusively on personal assets (e.g., RASP and Psychological Resilience).
- Surprisingly, only three measures address resilience as an outcome, assessing it as the phenomenon of "bouncing back" and "adapting" despite adversity (i.e., CD-RISC2, CD-RISC-10 and the BRS).
- The majority of the reviewed measures were tested in the United States (12 out of the 17), with the others using participant samples in Taiwan, Australia, Norway, the UK, or several countries.

7.2 Overall Quality of the Measures

- In general, the retained measures achieved acceptable internal consistency when values were reported for the whole scale. However, not all studies reported internal consistency for individual subscales (e.g., CD-RISC, RS-25), making it difficult to evaluate accurately the reliability of the measures.
- Of the 17 retained measures, only 10 were subjected to a test-retest assessment as part of their original scale development study, and among those, four revealed a weak temporal stability. The six measures that reported adequate test-retest values were the RASP, RSCA, CD-RISC, CD-RISC2 and RS-25.
- In terms of content validity, the review shows that several dimensions could be construed as learning outcomes of PSE. One clear exception concerns the dimensions that capture external factors. It should be noted that none of the measures were conceptualized to assess the acquisition of transferable skills. Thus it is unclear whether or not they deliver evidence of learning such skills as outcomes of postsecondary education. As such, they may not be ideally suited to assess resilience as a learning outcome of PSE.
- With the exception of the BPFI, all measures were subjected to factor/component analyses to test the structural aspects of the measures (e.g., PCA, EFA and CFA). In some cases, the factor structure did not fully support the hypothesized dimensions (e.g., CYRM-28, RASP, CD-RISC and RS-25). For the CD-RISC, this led to the refinement of the instrument from a 25-item to a 10-item measure (CD-RISC-10).
- With the exception of the CYRM-28 and the Psychological Resilience scale, all of the measures provided some evidence of acceptable criterion validity, either by demonstrating that they were

significantly correlated with similar constructs, distinct from unrelated constructs, or significantly correlated with outcomes.

- Finally, the measures vary in terms of how well they could apply to postsecondary students. While several measures were tested using student samples, the CYRM-28 was the only one to include Canadian participants. Some studies validated the measures using samples that may not generalize well to a broader student population. For example, the CYRM-28 was tested with vulnerable or at-risk participants, the Psychological Resilience scale was tested with older adults and the RSA was tested with a sample of military applicants.

Using the overall reliability and validity of the measures, SRDC indicates in the tables, using asterisks (**), the most promising scales to take forward for further consideration. These include the RASP, the RSCA, the BRS, the shorter versions of CD-RISC and the RS-25. Of these, SRDC has tested the BRS and CD-RISC2 in its longitudinal studies of young Canadians' access to and participation in postsecondary education. In the second phase of the project below, SRDC has evaluated further the performance of these scales in measuring and predicting resilience in samples that more closely resemble HEQCO's target population.

8. Analyses of Resilience using SRDC Data

This section of the report presents analysis and findings using SRDC's own longitudinal data from two recent demonstration projects: Future to Discover (FTD) and the British Columbia Advancement Via Individual Determination (BC AVID) pilot project (Ford et al., 2012; Ford et al., 2014). These experiments recruited students in early high school and tracked them for six or more years to determine the impacts of experimental education interventions intended to improve postsecondary access. The projects' datasets span several surveys of the students, running from baseline to 66 months later – the last of which contained the resilience measure – as well as data linked from administrative records on K-12 and postsecondary participation and achievement, plus student financial aid. A short description of the two projects follows.

FTD was developed by the Canada Millennium Scholarship Foundation, in partnership with the provincial governments of Manitoba and New Brunswick. FTD was a pilot project that aimed to test the effectiveness of two interventions (both individually and in combination) in improving access to PSE, particularly among youth who were disadvantaged by family income or educational background. The first intervention – Explore Your Horizons – provided information about academic and career options (including labour market trends, costs and financing of PSE), skills development, and support for career exploration and planning. It was delivered over three years through workshops, a magazine and a members-only website. Explore Your Horizons was offered in Manitoba and New Brunswick to students in all income groups. The second intervention – Learning Accounts – provided an early promise of substantial financial support to students provided they were accepted into a recognized PSE program. Learning Accounts was offered to students in New Brunswick from families with incomes at or below the provincial median. Over 5,400 students were initially recruited to the project. For all these students, the main impact of interest was enrolment in PSE and completion of their first year of studies. The resilience measure was included as part of the project to test the long-term effect of the interventions on students' ability to cope with the transition to PSE.

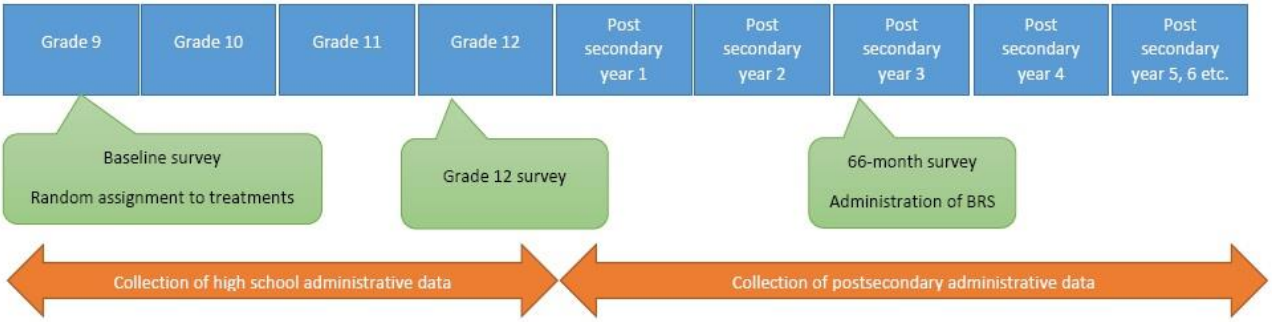
The BC AVID pilot project was established by the Canada Millennium Scholarship Foundation in partnership with the B.C. Ministry of Education to test how effectively the AVID program, a U.S. college-preparatory program, increases access to PSE in a Canadian context. The goal of AVID is to support "middle-achieving"

students with a B to C average who are motivated to pursue PSE. It encourages students to acquire skills that promote academic success (such as good work habits and organizational skills) and that enable them to cope with the demands of the more rigorous courses that are often pre-requisites for entry to postsecondary education. The program places students in these advanced academic courses and in an AVID elective class focused on writing, inquiry, collaboration, organization and study skills and includes regular tutorials with older students. AVID programs are coordinated by the non-profit AVID Center in San Diego, which supports and certifies AVID sites worldwide. The BC AVID pilot project involved over 1,500 students in 18 schools. Much like FTD, the primary impact of interest was students' enrolment in PSE and completion of their first year of studies. The measure of resilience aimed to test AVID's impact on student's ability to cope with the transition to PSE.

8.1 Analyses from the FTD Project – Full Sample

As part of the FTD project, 3,053 former high school students completed the BRS in 2009-2011, when they were 20-21 years of age. This is relatively late in the typical educational trajectory of students (see Figure 2). Nonetheless, for most of the New Brunswick sample, SRDC can examine long-term outcomes from administrative data on their postsecondary program participation and completion for three years following the measurement of resilience.

Figure 2: Data Collection in Relation to Typical "on-time" Education Pathway of FTD Participants



The research question that guided the analysis in this section is the following:

- Does the BRS demonstrate good reliability and validity using a Canadian sample of young adults? To be considered valid and reliable, our results using the FTD sample should yield similar results to those found in the BRS validation study (Smith et al., 2008).

The FTD sample used for the analyses in this report comprised 3,053 students who completed all six BRS items, including 1,412 males (46%) and 1,541 females (54%). Results show that the BRS scores ranged from 1 to 5 with a mean score of 3.70, and the distribution was adequate, with no signs of a floor or ceiling effect. The BRS items and the PCA loadings generated from these data are displayed in Table 5.

Consistent with the BRS validation study, the results show that all items converged on a single factor, yielding strong loadings ranging from .63 to .74 and accounting for 47.5% of the variance, somewhat less than what was found in the validation study (i.e., samples 1-4 ranged from 57% to 67% in Smith et al., 2008). Internal consistency was satisfactory, with a Cronbach alpha of .78. Inter-item correlations were moderate to high, ranging from .31 to .49. Since the FTD project was not designed to validate the BRS, there are few

variables against which to test the measure's convergent validity. Satisfaction with life was the only resilience-related construct included in the survey. The results show that the BRS scores were significantly positively linked to life satisfaction, but this correlation was relatively weak (r = .14, p < .01).

Table 5: Items and PAC Factor Loadings of the BRS with the Full Sample

Items	Factor Loadings
1. I tend to bounce back quickly after hard times	.64
2. I have a hard time making it through stressful events (R)	.72
3. It does not take me long to recover from a stressful event	.70
4. It is hard for me to snap back when something bad happens	.74
5. I usually come through difficult times with little trouble	.63
6. I tend to take a long time to get over set-backs in my life (R)	.69

Note. *N* = 3,053; R = reverse coded items

8.2 Analyses from the FTD Project by Subgroup

The research questions that guided the analysis in this section are the following:

- Is the BRS reliable and valid across different subgroups or are there subgroups for which the BRS is less stable? If the BRS is to be used as a large-scale measure in PSE institutions, it should have the ability to evaluate resilience reliably and accurately regardless of the subgroup.
- Are there mean BRS score differences among some subgroups? Lack of differences would suggest that on average, the groups being compared report similar levels of resilience. This analysis was performed as a way of determining the measure's ability to discriminate among certain subgroups in the expected direction. For example, based on the resilience research, we would expect participants from lower-income families to report lower levels of resilience than those from higher-income families.

First, we tested the BRS' psychometric properties and compared BRS mean differences among the following subgroups:

- Student cohorts: Manitoba participants (grade 9 in 2005), New Brunswick Cohort 1 participants (grade 9 in 2004), New Brunswick Cohort 2 participants (grade 9 in 2005)
- Language sector: Francophone and Anglophone
- Experimental groups:
    - Explore Your Horizon (EYH), students offered 40 hours of enhanced career education components in grades 10 through 12
    - Learning Accounts (LA), students guaranteed before they entered grade 10 a student aid grant of up to $8,000 conditional only on postsecondary registration (offered to high school students in New Brunswick with family income below the provincial median)
    - Combined EYH and LA (EYH/LA)
    - Comparison group (neither EYH nor LA offered)
- Sex: males and females
- Income: lower- and higher-income (above and below median family income for given family size at baseline)

The findings displayed in Table 6 show that the psychometric properties were relatively consistent across subgroups. Principal components analysis (PCA) loadings and reliability coefficients were relatively strong for all subgroups. However, while the correlations between the BRS scores and life satisfaction were all significant, they varied considerably in size by subgroup, ranging from .07 to .39. Of particular interest was the apparent invariance between the Francophone and Anglophone subgroups, offering preliminary support for the French translated version of the BRS.

Table 6: Psychometric Properties of the BRS by Subgroup

Subgroup Classification	Subgroups	PCA Loading Range	Reliability (α)	Correlations between BRS & Life Satisfaction
Student cohort	Manitoba	.64-.75	.78	.32
	New Brunswick C1	.62-.74	.78	.11
	New Brunswick C2	.64-.73	.77	.34
Language Sector	Francophone	.57-.74	.75	.09
	Anglophone	.67-.76	.80	.36
Experimental group	Comparison group	.65-.74	.79	.10
	EYH	.64-.72	.77	.36
	EYH/LA	.53-.75	.74	.39
	LA	.60-.79	.78	.28
Sex	Males	.59-.74	.75	.17
	Females	.65-.73	.79	.12
Income	Lower	.61-.74	.76	.11
	Higher	.65-.74	.79	.07

Note. N = 3,053; C1 = Cohort 1; C2 = Cohort 2

SRDC also examined subgroup differences in mean BRS scores between student cohorts, between Francophones and Anglophones, between experimental groups, between males and females, and between lower- and higher-income families. First, findings show that there was a significant difference in mean BRS scores between the three student cohorts. A post hoc test revealed that the difference was between the New Brunswick Cohort 1 (M = 3.73) and the New Brunswick Cohort 2 (M = 3.67) (F(2, 3015) = 4.13, p < .05), possibly reflecting temporal factors (such as the timing of their high school graduation in relation to the 2008 recession). Second, results show that on average, males scored significantly higher than females (M =3.81 and 3.62 respectively) on the BRS (t (3051) = 9.02, p < .001). This finding does not fully parallel those obtained in the BRS validation study. Smith and his colleagues (2008) found that men reported being more resilient than women in a sample of cardiac rehabilitation patients, but found no gender difference in the two samples of undergraduate students. Third, a significant difference was observed for income, such that students from higher-income families scored higher on the BRS (M = 3.73) than those from lower-income families (M = 3.68) (t (3051) = -2.63, p = 0,009). This finding supports the notion that financial support may buffer against the effect of stress.

No significant difference was found in mean BRS scores between Francophones and Anglophones, nor between the experimental groups. It is surprising that students who participated in FTD's EYH program did not report higher levels of resilience given the program's emphasis on students' preparation for PSE. It is possible that without continued support or programming, the program's impact attenuates with the passage

of time. Plausibly also, given the rigorous experimental design, the intervention may simply not have altered levels of resilience.

8.3 Analyses from the FTD Project Using Administrative Data

The research questions that guided the analysis for this section are the following:

- Can the BRS predict PSE outcomes such as enrolment, academic persistence and graduation? To be useful as an indicator of postsecondary program quality, resilience should be linked to positive academic outcomes.
- Is receipt of financial aid in the first, second or third year of postsecondary education associated with students' perception of resilience – as measured by the BRS – during their third postsecondary year? While this analysis was exploratory in nature, we expected that financial aid would generally be associated with increased resilience.

To examine the BRS' ability to predict educational outcomes, we used linked long-term administrative data on students' postsecondary program participation and completion for three years following measurement of resilience (postsecondary years 4, 5 and 6). Table 7 shows that the BRS scores collected in postsecondary year 3 were significantly related to a few postsecondary outcomes that could be characterized as 'resilient' behaviour in postsecondary years 4, 5 and 6. More specifically, the results suggest that a higher BRS score in postsecondary year 3 was significantly associated with enrolment in university, with continued participation in postsecondary education and with university graduation during any of postsecondary years 4, 5 or 6. Interestingly, the BRS did not appear to predict college enrolment or graduation. While the effects observed are small, they provide some support that the BRS measure of resilience is associated with positive postsecondary outcomes, especially for university students.

Table 7: Correlations between Postsecondary Outcomes and the BRS

Postsecondary Outcomes	Correlation
Enrolled in college during either years 4, 5 or 6	-.02
Enrolled in university during either years 4, 5 or 6	.06**
Continuing in PSE during either years 4, 5, or 6	.04*
Graduated from college during either years 4, 5 or 6	-.02
Graduated from university during either years 4, 5 or 6	.05*

Note. *p<.05, **p<.01, N = 2,479

To further explore the link between educational outcomes and resilience, we examined if there was a BRS mean difference between students who dropped out of postsecondary education and those who dropped out but eventually returned and graduated. In the FTD sample, among those who dropped out, 25% eventually came back and graduated. Findings show that students who left postsecondary education but eventually graduated had a slightly higher BRS mean score (M = 3.76, N = 97) than those who left and did not graduate (M = 3.67, N = 291), but this difference was not significant (t(386) = -1.35, p = 0.18).

We also examined mean BRS scores on the basis of financial aid received in the first three years of postsecondary education for a number of subgroups created using enrolment in postsecondary education, FTD experimental condition and family income. The two financial aid variables examined were: financial aid

received in any postsecondary years 1, 2 or 3, and total amount of financial aid received in the first three years of postsecondary education. In this analysis, mean BRS scores by subgroup ranged from 3.54 to 3.86. The findings are presented in Appendix B. The pattern is not entirely clear, but it looks as though receiving financial aid was associated with slightly higher resilience, regardless of the experimental condition and after controlling for income.

8.4 Analyses from the BC AVID Project

SRDC performed additional analyses on a separate dataset from its BC AVID Pilot Project, which included the CD-RISC2 reviewed in this report. Participants were recruited in grade 8 from BC secondary schools and tracked for six years using very similar surveys and administrative records to FTD. The data analyzed from this project included 1,095 of these students who completed the CD-RISC2 when they were 19-20 years of age (postsecondary year 2). To date, the administrative data for BC AVID pre-dates or is simultaneous with the measure of resilience. Post-resilience measurement postsecondary data have not been linked to survey records, restricting the scope for predictive analysis using the BC AVID dataset.

The research questions that guided the analysis in this section are the following:

- Does the CD-RISC2 demonstrate good reliability and validity using a Canadian sample of young adults? Since this measure is comprised of only two items, the psychometric analyses that can be performed on the scale are limited. However, these additional data provide a good opportunity to explore how a short resilience scale performs with a sample of Canadian students that is somewhat equivalent to the FTD sample who responded to the BRS.
- Can students' past experiences, intentions or behaviours predict CD-RISC scores? This exploratory analysis examined the CD-RISC2's ability to discriminate between subgroups based on students' various past experiences, intentions and behaviours, which we expected would be linked to resilience (e.g., receiving financial aid, intention to persist in first year of PSE, confidence in skills and ability to succeed in first year of PSE).

The two items of the CD-RISC2 were measured using a five-point scale ranging from 1 = "strongly disagree" to 5 = "strongly agree": (1) "I tend to bounce back quickly after hard times" and (2) "I am able to adapt to change." Results of the psychometric analyses showed signs of a ceiling effect on the second item, with 25% of the sample responding at the upper limit of the instrument (i.e., responding with "strongly agree"), but the negatively skewed distribution of the two combined items was deemed adequate. The CD-RISC2 scores range from 1.5 to 5, with a mean score of 4.09.

The correlation between the two items was adequate (r = .35) and results show that the CD-RISC2 was significantly positively associated with three resilience-related constructs measured in the same 66-month survey, namely: no perceived barriers in obtaining desired education (r = .13, p < .01), life satisfaction (r = .21, p < .01) and health (r = .22, p < .01). Finally, consistent with the BRS in the FTD sample, males rated slightly higher on the CD-RISC2 than females (M = 4.12 and 4.06 respectively), but this difference is only significant at a 90% confidence interval.

We also explored CD-RISC2 mean differences against students' past experiences, intentions or behaviours, as well as on financial aid variables. As shown in Table 8, the t-test results suggest that students who enrolled in postsecondary education were no more resilient than those who did not enroll. However,

significant associations emerged for a number of other comparisons. More specifically, on average, CD-RISC2 scores were greater for students who did not think about dropping out in the first year of PSE, who had the confidence in their skills and ability to do well in the first year of PSE, who were satisfied with the decisions they made about their education, who knew how to get information about financial aid, and who volunteered during the previous 12 months. With regard to the financial aid variables, only one significant CD-RISC2 mean difference emerged. Students who received a scholarship, awards or prizes for PSE were more likely to score higher on the CD-RISC2 than those who did not receive them.

Table 8: Mean CD-RISC2 Differences Based on Student Past Experience, Intentions or Behaviours

Groups based on student perceptions or behaviours	Mean BRS	SD	N	*t*-test
Did not enroll in PSE	4.01	.64	651	0.90
Enrolled in PSE	4.01	.58	107	
Did not think about dropping out during the first year of PSE	4.11	.57	884	2.54*
Thought about dropping out during the first year of PSE	4.00	.65	204	
Lacked confidence in skills and ability to do well in first year of PSE	4.05	.59	898	-4.98***
Had the confidence in skills and ability to do well in first year of PSE	4.28	.57	191	
Not satisfied with decisions made about one's education	4.04	.59	805	-4.80***
Satisfied with decisions made about one's education	4.23	.58	285	
Felt that they did not know how to get info about student financial aid	3.99	.64	385	-4.12***
Felt that they knew how to get info about financial aid	4.14	.56	695	
Did not volunteer during the last 12 months	4.02	.58	217	-2.04*
Volunteered during the last 12 months	4.11	.59	877	
Groups based on financial aid variables	**Mean BRS**	**SD**	**N**	***t*-test**
Never applied for government-sponsored student financial aid	4.08	.59	852	-0.29
Applied for government-sponsored student financial aid	4.10	.61	235	
Did not receive government student loans	4.10	.59	934	.032
Received government student loans	4.09	.51	129	
Did not receive funds from a RESP	4.09	.58	893	-0.06
Received funds from a RESP	4.09	.63	140	
Did not receive grant/bursaries from Millennium and or other sources	4.10	.59	871	0.52
Received grant/bursaries from Millennium and or other sources	4.07	.60	215	
Did not receive scholarship/awards/prizes for PSE	4.07	.59	879	-2.62**
Received scholarship/awards/prizes for PSE	4.19	.58	203	

Note. *$p < 0.05$, **$p < 0.01$, ***$p < 0.001$

9. Summary of Analyses Using SRDC Data

In sum, SRDC's analyses on the FTD data support the psychometric properties of the BRS and the relevance of the instrument for use with postsecondary students across a variety of subgroups in a Canadian context. While there is limited support for its convergent validity, the results provide evidence that the BRS can predict postsecondary outcomes characterized as 'resilient,' such as enrolment in university, continued participation in postsecondary education and graduation from university. The analysis of BRS mean difference among subgroups raises a few practical questions. For instance, how can we explain that in some

but not all samples of young adults in the general population, men report higher levels of resilience than women? In addition, is the non-significant BRS mean difference between FTD's experimental and comparison groups a sign that the BRS is unable to detect student-level change, or does it simply reflect a lack of long-term effect of the FTD program on this outcome? Longitudinal studies in the PSE context that track resilience using the BRS are needed to evaluate the measure's ability to assess student-level changes over time accurately and to better understand resilience's overall role in students' PSE experience.

Our analyses using the BC AVID data revealed a ceiling effect on one of the CD-RISC2 items, which could limit measurement variability and result in reduced statistical power. This is an important consideration for use of the CD-RISC2 as an outcome measure, especially if there is a desire to use it to detect change over time. Despite this limitation, the CD-RISC2 correlated more strongly with life satisfaction than did the BRS and showed the measure's ability to discriminate between subgroups of students on related constructs. While these results may appear encouraging, it is not clear whether resilience, as measured by the BRS or the CD-RISC2, represents a transferable skill that can actually be developed in a PSE context. In fact, both these measures focus on the phenomenon of "bouncing back" and "adapting" despite adversity, instead of acquisition of a skill per se.

10. Recommendations and Practical Considerations

1. All reviewed measures are self-report scales. While this type of measure has limitations, it is an efficient and cost-effective approach to assessing subjective variables (e.g., the measures can be completed online). As previously mentioned, self-report methods are often considered to be the most appropriate to measure people's personal experiences (Paulhus & Vazire, 2007). However, given their proneness to response biases, they may be informatively combined with objective measures such as administrative measures of academic persistence.
2. Since the resilience measure would eventually serve as an indicator of an acquired transferable skill, choices should be based on the extent to which the dimensions under assessment are malleable to interventions by having the capacity to detect change. This favours scales that demonstrate good test-retest reliability, good predictive validity, as well as scales that can adequately discriminate among subgroups (e.g., RASP, BRCS, BRS, CD-RISC2 and RS-25).
3. Comprehensive measures that attempt to capture a variety of resilience-related dimensions tend to be lengthy, demanding more time on students' part. This in turn could affect response rates and the validity of responses. In some cases, subscales of interest could be used as stand-alone measures of resilience, providing they demonstrate good psychometric properties as separate entities (e.g., the four subscales of the RSA that assess internal assets).
4. Two of the measures are copyrighted and only available commercially, which would add significantly to the cost of administrating the measure (i.e., the RS-25/RS-14 and the RSCA). There are also costs associated with the use of the Resiliency Scale.
5. None of the measures were conceptualized to assess the acquisition of transferable skills. Thus it is unclear whether or not they deliver evidence of learning such skills. Furthermore, there is no evidence that they measure outcomes of postsecondary learning. This means that the scales are not likely ideally suited for use in assessment of acquiring a transferable skill in the postsecondary context.
6. As demonstrated in SRDC's resilience framework, there are many factors associated with resilience. The early conceptualizations of resilience have been criticized for being too narrow, focusing on the

stable traits. In more recent years, the way resilience has been operationalized may appear too broad and undefined, often including a mix of external factors, personal assets and coping processes. It is not realistic nor desirable to capture them all in one measure. Breaking down the different dimensions into specific skills that are most relevant to the PSE context and assessing those skills rather than a global indicator of resilience may be wiser and more appropriate.

11. Limitations

- Many of the scales found in the literature have evolved over the years or have been adapted to suit the purpose of the sample under study. In general, we only reported findings from the original scale development and validation studies. In some cases, we chose to present versions that resulted from refinements of the measures (e.g., RYDM) or both (e.g., CD-RISC).
- Three of the scales were not available for viewing, or only partial items were provided with the validation studies. As such, an effort was made to contact the first author by email to obtain a copy of the full final version of the measures in question. The author of the RS scale agreed to share a copy of the scale with SRDC for viewing purposes only. As for the RSCA, it can only be accessed commercially. Finally, there is a copyright on the RS-25, but items can be viewed at the following website: http://www.resiliencescale.com/your-resilience/test-your-resilience/.
- The FTD and BC AVID datasets used in this report were not designed to test the convergent or predictive validity of the BRS and CD-RISC2 and consequently were not ideally suited for this purpose. To assess properly the convergent validity of the scales, the data would have included a wider set of resilience-related constructs. In addition, to evaluate adequately the predictive value of resilience on postsecondary outcomes, resilience should have been assessed at the end of high school, before students enroll in postsecondary education, rather than in postsecondary years 2 or 3.

12. Overall Conclusion

As society and the economy continue to evolve rapidly in Ontario and worldwide, there is a need to redefine the learning outcomes of postsecondary education in order to better prepare students to succeed in work and life. With this in mind, HEQCO is identifying learning outcomes that Ontario's public colleges and universities need to deliver and seeking ways to assess their achievement. HEQCO is currently using a framework which includes four types of learning outcomes relevant to the postsecondary level: discipline-specific outcomes, basic cognitive outcomes, higher-order cognitive outcomes and transferable outcomes.

The focus of this project was on transferable skills, sometimes called 'soft skills' or 'essential skills,' which include a number of personality and behavioural attributes, such as teamwork, time management and resilience (Goleman, 1998, cited in Deller et al., 2015). Transferable skills have been associated with academic, professional and personal success (e.g., Weingarten, 2014, Feb. 13, cited in Deller et al., 2015). They are considered valuable since, given the right support, they are applicable and transferable across a variety of contexts (Jackson, 2013). Guided by the learning outcomes approach, HEQCO expressed an interest in finding the best ways of assessing resilience as an outcome of postsecondary education.

In this report, SRDC first set out to investigate how resilience was defined and operationalized in the literature. Our review of the literature demonstrated that the concept of resilience has been defined and operationalized in diverse ways. The understanding of resilience has changed over the years and continues to evolve today. Lack of a single clear definition has led to the construction of several different instruments to measure different dimensions of resilience. It appears clear from SRDC's findings that resilience can be viewed as a multidimensional construct and studied from a number of different perspectives.

Our search of the literature identified resilience measures that could usefully be applied or adapted to the postsecondary level. Using a list of selection criteria, we retained and evaluated the psychometric properties of 17 measures, some of which were refinements of original instruments. Overall, the measures demonstrated respectable psychometric properties and most of them appeared adequate for use with postsecondary students. In addition, the measures included a number of dimensions that could potentially be construed as learning outcomes of postsecondary education.

SRDC's analyses using Future to Discover data supported the psychometric properties of the Brief Resilience Scale (BRS) and the relevance of the instrument for use with postsecondary students across a variety of subgroups in a Canadian context. While there was limited support for its convergent validity, the results provided evidence that the BRS can predict postsecondary outcomes characterized as 'resilient,' such as enrolment in university, continued participation in postsecondary education and graduation from university. The analysis of BRS mean differences among subgroups suggests that more longitudinal research is needed to evaluate the measure's ability to assess accurately student-level changes over time and to better understand the development of resilience in students' PSE experience. Furthermore, our analyses using the BC AVID data revealed that the two-item Connor-Davidson Resilience Scale (or CD-RISC2) was associated with educational outcomes in the expected direction and supported its use with young Canadian adults in an educational context. However, this measure may have limitations in terms of its ability to detect student-level change over time.

Based on the overall findings of the review and analyses, SRDC recommends the Resiliency Attitudes and Skills Profile (RASP), Resiliency Scales for Children & Adolescents (RSCA), the BRS, and the shorter versions of the CD-RISC and Resilience Scale (RS-25) as the most promising scales to take forward for further consideration. It is worth noting, however, that these measures are all self-report assessments of resilience. This is not entirely surprising given psychology's high reliance on self-reported methods to assess self-concepts or constructs that tap subjective experience. Using self-report scales to assess this type of construct is often more efficient and inexpensive than other methods (Paulhus & Vazire, 2007) and thus the most appropriate course of action. However, it is worth noting that none of the measures included in the review were conceptualized to assess the acquisition of transferable skills. Thus it is not clear if they could apply as such.

In sum, as demonstrated in SRDC's resilience framework, there are many factors associated with resilience. Early conceptualizations of resilience have been criticized for being too narrow, focusing primarily on stable traits. In more recent years, the way resilience has been operationalized appears too broad and undefined, often including a mix of external factors, personal assets and coping processes. It may not be realistic nor desirable to capture all of these dimensions in one measure to assess outcomes of PSE. Breaking down the different dimensions into specific skills that are most relevant to the PSE context and assessing those skills rather than a global index of resilience may be wiser and more appropriate. This review has shown that resilience research is still evolving and that little has been done to develop tools specifically designed for use

with students at the postsecondary level. More research is needed in this area, but we can look to 'learning skills and work habits' assessed in Ontario's elementary and secondary schools for inspiration. Working from the experience in this sector, it may be advisable to try to align language and learning outcomes not only across postsecondary institutions, but also along the continuum of education spanning the elementary, secondary and postsecondary levels.

References

Ahern, N. R., Kiehl, E. M., Sole, M. L., & Byers, J. (2006). A review of instruments measuring resilience. *Issues in Comprehensive Pediatric Nursing, 29*, 103-125.

Alonso-Tapia, J., & Villasana, M. (2014). Assessment of subjective resilience: cross-cultural validity and educational implications. *Journal for the Study of Education and Development, 37*(3), 629-664.

Bartone, P. T., Ursano, R. J., Wright, K. W., & Ingraham, L. H. (1989). The impact of a military air disaster on the health of assistance workers: A prospective study. *Journal of Nervous and Mental Disease, 177*, 317-328.

Baruth, K. E., & Caroll, J. J. (2002). A formal assessment of resilience: The Baruth Protective Factors. *Journal of Individual Psychology, 58*, 235-244.

Block, J. H., & Block, J. (1980). The role of ego-control and ego-resiliency in the organization of behavior. In W. A. Collins (ed.), *Development of cognition, affect, and social relations: The Minnesota symposia on child psychology* (vol. 13, pp. 39-101). Hillsdale, NJ: Erlbaum.

Block, J., & Kremen, A. M. (1996). IQ and ego resiliency: Conceptual and empirical connections and separateness. *Journal of Personality and Social Psychology, 70*, 349-361.

Campbell-Sills, L., & Stein, M. B. (2007). Psychometric analysis and refinement of the Connor-Davidson Resilience Scale (CD-RISC): Validation of a 10-item measure of resilience. *Journal of Traumatic Stress, 20*(6), 1019-1028.

Carlson, D. J. (2001). *Development and validation of a College Resilience Questionnaire*. Unpublished doctoral dissertation, University of Nebraska, Lincoln, NE.

Clauss-Ehlers, C. S. (2008). Sociocultural factors, resilience, and coping: Support for a culturally sensitive measure of resilience. *Journal of Applied Development Psychology, 29*, 197-212.

Conley, D. T. (2013, January 22). Rethinking the Notion of "Noncognitive." *Education Week*. Retrieved from http://www.edweek.org/ew/articles/2013/01/23/18conley.h32.html

Connor, K. M., & Davidson, J. R. T. (2003). Development of a new resilience scale: The Connor-Davidson Resilience Scale (CD-RISC). *Depression and Anxiety, 18*, 76-82.

Craggs, S. (2012). One-third of McMaster students battle depression: survey. *CBC News*. Retrieved from http://www.cbc.ca/news/canada/hamilton/news/one-third-of-mcmaster-students-battle-depression-survey-1.1200815

De Baca, C. (2010). Resiliency and academic performance. A review of the literature. *ScholarCentric*, 1-5. Retrieved from http://www.scholarcentric.com/wp-content/uploads/2014/03/SC_Resiliency_Academic_Performance_WP.pdf

Delany, C., Miller, K. J., El-Ansary, D., Remedios, L., Hosseini, A., & McLeod, S. (2015). Replacing stressful challenges with positive coping strategies: a resilience program for clinical placement learning. *Advances in Health Science Education.*

Distelberg, B. J., Martin, A. S., Borieux, M., & Oloo, W. A. (2015). Multidimensional Family Resilience Assessment: The individual, Family, and Community Resilience (IFCR) Profile. *Journal of Human Behavior in the Social Environment, 25*, 552-570.

Duckworth, A. L., Peterson, C., Matthews, M. D., & Kelly, D. R. (2007). Grit: Perseverance and passion for long-term goals. *Journal of Personality and Social Psychology, 9*, 1087-1101.

Duckworth, A. L., & Quinn, P. D. (2009). Development and validation of the Short Grit Scale (Grit-S). *Journal of Personality Assessment, 91*(2), 166-174.

Fitzpatrick, R., Davey, C., et al. (1998). Evaluating patient-based outcome measures for use in clinical trials. *Health Technology Assessment, 2*(14), 1-74

Fleming, J., & Ledogar, R.J. (2008). Resilience, and evolving concept: A review of literature relevant to Aboriginal research. *Pimatisiwin, 6*(2), 7-23.

Friborg, O., Barlaug, D. Martinussen, M., Rosenvinge, J. H., & Hjemdal, O. (2005). Resilience in relation to personality and intelligence. *International Journal of Methods in Psychiatric Research, 14*(1), 29-42.

Friborg, O., Hjemdal, O., Rosenvinge, J., & Martinussen, M. (2003). A new rating scale for adult resilience: what are the central prospective resources behind healthy adjustment? *International Journal of Methods in Psychiatric Research, 12*(2), 65-76.

Furlong, M. J., Ritchey, K. M., & O'Brennan, L. M. (2009). Developing norms for the California Resilience Youth Development Module: Internal Assets and School Resources subscales. *The California School Psychologist, 14*, 35-46. Retrieved from http://files.eric.ed.gov/fulltext/EJ878359.pdf

Gartland, D., Bond, L., Olsson, C. A., Buzwell, S., & Sawyer, S. M. (2011). Development of a multi-dimensional measure of resilience in adolescents: The adolescent resilience questionnaire. *BMC Medical Research Methodology, 11*(134), 1-10. Retrieved from http://www.biomedcentral.com/1471-2288/11/134

Goodman, R. (1997). The Strengths and Difficulties Questionnaire: A Research Note. *Journal of Child Psychology and Psychiatry, 38,* 581-586.

Goodman, A., Lamping, D. L., & Ploubidis, G. B. (2010). When to use broader internalising and externalising subscales instead of the hypothesised five subscales on the Strengths and Difficulties Questionnaire (SDQ): data from British parents, teachers and children. *Journal of Abnormal Child Psychology, 38,* 1179-1191.

Grant, A. M., Curtayne, L., & Burton, G. (2009). Executive coaching enhances goal attainment, resilience and workplace well-being: A randomized controlled study. *The Journal of Positive Psychology, 4,* 396-407. Retrieved from http://www.solutions-centre.org/pdf/Grant-et-al-Executive-coaching-enhances-goal-attainment-resilience-and-workplace-well-being-a-randomised-controlled-study-JOPP-20092.pdf

Hanson, T. L., & Austin, G. A. (2002). *Health risks, resilience, and the Academic Performance Index* (California Healthy Kids Survey Factsheet 1). Los Alamitos, CA: WestEd. Retrieved from https://chks.wested.org/resources/factsheet.pdf

Hanson, T. L., & Kim, J. O. (2007). *Measuring resilience and youth development: the psychometric properties of the Healthy Kids Survey.* Issues & Answers Report, REL 2007–No. 034. Washington, DC: U.S. Department of Education, Institute of Education Sciences, National Center for Education Evaluation and Regional Assistance, Regional Educational Laboratory West. Retrieved from http://ies.ed.gov/ncee/edlabs/regions/west/pdf/REL_2007034.pdf

Hjemdal, O., Friborg, O., Stiles, T. C., Martinussen, M., & Rosenvinge, J. H. (2006). A new scale for adolescent resilience: Grasping the protective resources behind healthy development. *Measuring and Evaluation in Counseling and Development, 39,* 84-96.

Huang, Y.-C., & Lin, S.-H. (2013). Development of the Inventory of College Students' Resilience and evaluating the measurement invariance. *British Journal of Guidance & Counselling, 41*(5), 471-486.

Hunter, A. J., & Chandler, G. E. (1999). Adolescent resilience. *Image: Journal of Nursing Scholarship, 31*(2), 243-247.

Hurtes, K. P., & Allen, L. R. (2001). Measuring resiliency in youth: The Resiliency Attitudes and Skills Profile. *Therapeutic Recreation Journal, 35*(4), 333-347.

Hystad, S. W., Eid, J., Johnsen, B. H., Laberg, J. C., & Bartone, P. T. (2010). Psychometric properties of the revised Norwegian dispositional resilience (hardiness) scale. *Scandinavian Journal of Psychology, 51*, 237-245.

Jackson, D. (2013). Business graduate employability – where are we going? *Higher Education Research and Development, 32*(5), 776-790. Retrieved from http://ro.ecu.edu.au/cgi/viewcontent.cgi?article=1016&context=ecuworks2013

Jew, C. J., Green, K. E., & Kroger, J. (1999). Development and validation of a measure of resiliency. *Measurement and Evaluation in Counseling and Development, 32*, 75-89.

Khawaja, N. G., Moisuc, O., & Ramirez, E. (2014). Developing an Acculturation and Resilience Scale for use with culturally and linguistically diverse populations. *Australian Psychologist, 49*, 171-180.

Kline, R. B. (1998). *Principles and Practice of Structural Equation Modeling*. Guilford Press: New York, NY.

Klohnen, E. C. (1996). Conceptual analysis and measurement of the construct of ego-resiliency. *Journal of Personality and Social Psychology, 70*(5), 1067-1079.

Knight, C. (2007). A resilience framework: Perspectives for educators. *Health Education, 107*(6), 543-555.

Kobasa, S. C., Maddi, S. R., & Kahn, S. (1982). Hardiness and health: A prospective study. *Journal of Personality and Social Psychology, 42,* 168-177.

Koenig, T. W., Parrish, S. K., Terregino, C. A., Williams, J., Dunleavy, D., & Volsch, J. M. (2013). Core personal competencies important to entering students' success in medical school: What are they and how could they be assessed early in the admission process? *Academic Medicine, 88*(5), 603-613.

Laudadio, A., & D'Alessio, M. (2011). The validation process of the Resilience Stories Scale. *Rassegna Psicologia, 3*, 111-126.

Lennon, M. C., Frank, B., Humphreys, J., Lenton, R., Madsen, K., Omri, A., & Turner, R. (2014). *Tuning: Identifying and Measuring Sector-Based Learning Outcomes in Postsecondary Education*. Toronto: Higher Education Quality Council of Ontario. Retrieved from http://www.heqco.ca/SiteCollectionDocuments/Tuning%20ENG.pdf

Lewis, F. M., & Gallison, M. (1998). *Technical Paper, Family Functioning Study*. Seattle, WA: University of Washington.

Lim, M.-L., Broekman, B. F. P., Wong, J. C. M., Wong, S.-T., & Ng, T.-P. (2011). The development and validation of the Singapore Youth Resilience Scale (SYRESS). *The international Journal of Educational and Psychological Assessment, 8*(2), 16-30.

Lunau, K. (2012). Mental health crisis on campus: Canadian students feel hopeless, depressed, even suicidal. *Macleans*. Retrieved from: http://www.macleans.ca/education/uniandcollege/the-mental-health-crisis-on-campus/

Luthar, S. S., Cicchetti, D., & Becker, B. (2000). The construct of resilience: A critical evaluation and guidelines for future work. *Child Development, 71*(3), 543-562.

Majid, S. M., Liming, Z., Tong, S., & Raihana, S. (2012). Importance of soft skills for education and career success. *International Journal for Cross-Disciplinary Subjects in Education, Special Issue, 2*(2), 1036-1042.

Marzano, R. J., & Heflebower, T. (2012). *Teaching & Assessing 21st Century Skills.* Marzano Research Laboratory: Bloomington, IN.

Masten, A. S. (2001). Ordinary magic: Resilience processes in development. *American Psychologist, 56,* 227-238.

Mayr, T., & Ulich, M. (2009). Social-emotional well-being and resilience of children in early childhood settings – PERIK: an empirically based observation scale for practitioners. *Early Years, 29*(1), 4-57.

Ministry of Education (2010). *Growing Success: Assessment, Evaluation, and Reporting in Ontario Schools. First Edition, Covering Grades 1 to 12*. Retrieved from https://www.edu.gov.on.ca/eng/policyfunding/growSuccess.pdf

Ministry of Education (2014). *Achieving Excellence: A Renewed Vision for Education in Ontario*. Retrieved from: http://www.edu.gov.on.ca/eng/about/renewedVision.pdf

Naz, M. Saleem, S., & Mahmood, Z. (2010). Development of Indigenous Resilience Scale for Rescue 1122 Workers. *Pakistan Journal of Psychological Research, 25*(2), 149-163.

Nowack, K. M. (1989). Coping style, cognitive hardiness, and health status. *Journal of Behavioral Medicine, 12*, 145-158.

Noya, A., & Clarence, E. (2009). *Community capacity building: fostering economic and social resilience. Project outline and proposed methodology*, November 2009, working document, CFE/LEED, OECD. Retrieved from http://www.oecd.org/cfe/leed/44681969.pdf

Oshio, A., Nakaya, M., Kaneko, H., & Nagamine, S. (2003). *Psychological Reports, 93*, 1217-1222.

Pangallo, A., Zibarras, L., Lewis, R., & Flaxman, P. (2015). Resilience through the lens of interactionism: A systematic review. *Psychological Assessment, 27*(1), 1-20.

Paulhus, D. L., & Vazire, S. (2007). The self-report method of personality assessment. In R. W. Robins, R. C. Fraley, & R. Krueger (eds.), *Handbook of research methods in personality psychology* (pp. 224-239). New York: Guilford.

Paulus, D., & Christie, R. (1981). *Spheres of Control: An interactionist approach to assessment of peceived control*. In H. M. Lefcourt (ed.), Research with the locus of control construct (vol. 1). New York: Academic Press.

Pipe, T. B., Buchda, V. L., Launder, S., Hudak, B., Hulvey, L., Karns, K. E., & Pendergast, D. (2012). Building personal and professional resources of resilience and agility in the healthcare workplace. *Stress and Health, 28*, 11-22.

Prince-Embury, S. (2008). The Resiliency Scales for Children and Adolescents, Psychological Symptoms, and Clinical Status in Adolescents. *Canadian Journal of School Psychology, 23*(1), 41-56.

Robertson, I. T., Cooper, C. L., Sarkar, M., & Curran, T. (2015). Resilience training in the workplace from 2003 to 2014: A systematic review. *Journal of Occupational and Organizational Psychology, 88,* 533-562.

Robinson, J. A., Alexander, D. J., & Gradisar, M. S. (2009). Preparing for Year 12 examinations: Predictors of psychological distress and sleep. Australian *Journal of Psychology, 61*(2), 59-68.

Rosenberg, M. (1965). *Society and adolescent self-image.* Princeton, NJ: Princeton University.

Saklofske, D. H., Nordstokke, D., Prince-Embury, S., Crumpler, T., Nugent, S., Vesely, A., & Hindes, Y. (2013). Assessing personal resiliency in young adults: The Resiliency Scale for Children and Adolescents. In S. Prince-Embury & D. H. Saklofske (eds), *Resiliency in children, Youth and Adults: Translating Research into Practice* (pp. 189-198.). New York: Springer.

Sax, G. (1997). Principles of Educational and Psychological Measurement and Evaluation – 4th ed. California: Wadsworth Publishing Company.

Schroder, K. E. E., & Ollis, C. L. (2013). The Coping Competence Questionnaire: A measure of resilience to helplessness and depression. *Motivation and Emotion, 37*, 286-302.

Sharkey, J. D., You, S., & Schnoebelen, K. (2008). Relations among school assets, individual resilience, and student engagement for youth grouped by level of family functioning. *Psychology in the Schools, 45*(5), 402-418.

Sinclair, V. G., & Wallston, K. A. (2004). The development and psychometric evaluation of the Brief Resilient Coping Scale. *Assessment, 11*, 94-101.

Skinner, E., Pitzer, J., & Steele, J. (2013). Coping as part of motivational resilience in school: A multidimensional measure of families, allocations, and profiles of academic coping. *Educational Psychological Measurement, 73*(5), 803-835.

Smith, B. W., Dalen, J., Wiggins, K., Tooley, E., Christopher, P., & Bernard, J. (2008). The Brief Resilience Scale: Assessing the ability to bounce back. *International Journal of Behavioural Medicine, 15,* 194-200.

Smith, B. W., Epstein, E. M., Ortiz, J. A., Christopher, P. J., & Tooley, E. M. (2013). The Foundations of resilience: What are the critical resources for bouncing back from stress? In S. Prince-Embury & D.H. Saklofske (eds), *Resiliency in children, Youth and Adults: Translating Research into Practice* (pp. 167-187). New York: Springer.

Social Research and Demonstration Corporation (2015). *Review of Ontario's labour market related postsecondary credential mix Final Report.* Report prepared for the Ministry of Training, Colleges and Universities. Retrieved from https://www.tcu.gov.on.ca/pepg/srdc/

Takviriyanun, N. (2008). Development and testing of the Resilience Factor Scale for Thai adolescents. *Nursing and Health Sciences, 10*, 203-208.

The Canada Millennium Scholarship Foundation (2007). *Applying the construct of resilience to career development: Lessons in curriculum development*. Retrieved from https://www.eduweb.vic.gov.au/edulibrary/public/publ/research/publ/ccdfreport.pdf

Ungar, M. (2008). Resilience across cultures. *British Journal of Social Work, 38*, 218-235.

Ungar, M., & Liebenberg, L. (2009). Cross-cultural consultation leading to the development of a valid measure of youth resilience: the international resilience project. *Studia Psychologica, 51*(2-3), 259-269.

Ungar, M., & Liebenberg, L. (2011). Assessing resilience across cultures using mixed methods: construction of the Child and Youth Resilience Measure. *Journal of Mixed Methods Research, 5*(2), 126-149.

Vaishnavi, S., Connor, K., & Davidson, J. R. T. (2007). An abbreviated version of the Connor-Davidson Resilience Scale (CD-RISC), the CD-RISC2: Psychometric properties and applications in psychopharmacological trials. *Psychiatry Research, 152*(2-3), 293-297.

Waaktaar, T., & Torgersen, S. (2010). How resilient are resilience scales? The Big Five scales outperform resilience scales in predicting adjustment in adolescents. *Scandinavian Journal of Psychology, 5*(2), 157-163.

Wagnild, G. M. (2009a). *The Resilience Scale user's guide for the US English version of the Resilience Scale and the 14-Item Resilience Scale (RS-14).* Worden, MT: The Resilience Center.

Wagnild, G. (2009b). A review of the Resilience Scale. *Journal of Nursing Measurement, 17*(2), 105-113.

Wagnild, G. M., & Young, H. M. (1993). Development and psychometric evaluation of the Resilience Scale. *Journal of Nursing Measurement, 1*, 165-178.

Werner, E. E., & Smith, R. S. (1982). *Vulnerable but not invincible: A longitudinal study of resilient children and youth.* New York, NY: R. R. Donnelley and Sons, Inc.

Willcoxson, L., Cotter, J., & Joy, S. (2011). Beyond the first-year experience: the impact on attrition of student experience throughout undergraduate degree in six diverse universities. *Studies in Higher Education, 36*(3), 331-352.

Windle, G., Bennett, K. M., & Noyes, J. (2011). A methodological review of resilience measurement scales. *Health and Quality of Life Outcomes, 9*(8), 1-18.

Windle, G., Markland, D. A., & Woods, R. T. (2008). Examination of the theoretical model of psychological resilience in older age. *Aging & Mental Health, 12*(3), 285-292.

Winwood, P. C., Colon, R., & McEwen, K. (2013). A practical measure of workplace resilience: Developing the Resilience Work Scale. *Journal of Occupational and Environment Medicine, 55*(10), 1205-1212.

Yu, X., & Zhang, J. (2007). Factor analysis and psychometric evaluation of the Connor-Davidson resilience scale (CD-RISC) with Chinese people. *Social Behavior and Personality, 35*(1), 19-30.

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