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# TOWARD RIGOR AND PARSIMONY: A PRIMARY VALIDATION OF KOLVEREID'S (1996) ENTREPRENEURIAL ATTITUDES SCALES

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## INTRODUCTION

Understanding the antecedents of entrepreneurial behaviour, and the creation of new businesses, has been of increasing interest to entrepreneurship scholars, educators, and public policy-makers for many years. Considerable research has therefore been undertaken to understand the processes that may lead to entrepreneurial behaviours. Much of this work utilizes entrepreneurial intentions (EI) models built on psychological theory to examine the development of entrepreneurial behaviour (e.g., Bird, 1988; Bird & Jelinek, 1988; Krueger & Carsrud, 1993; Boyd & Vozikis, 1994; Krueger, Reilly & Carsrud, 2000; De Clercq, Honig & Martin, 2013).

Unfortunately, methodological weaknesses in the entrepreneurship literature have hampered our ability to conduct and interpret research with high levels of rigor (Mullen, Budeva & Doney, 2009; Martin, McNally & Kay, 2013; Rideout & Gray, 2013). For example, although many studies have demonstrated a positive relationship between entrepreneurship education and intentions to engage in entrepreneurial behaviour (e.g., Pittaway & Cope, 2007; Souitaris, Zerbinati & Al-Laham, 2007), some have found nonexistent or even negative relationships (e.g., Oosterbeek, van Praag & Ijsselstein, 2010), without identifying moderators that might account for such differences. Other examples of inadequate rigor include the misuse and misunderstanding of the widely used entrepreneurial orientations (EO) scholarship[1], including the inappropriate application of the Covin and Slevin (1989) scale design. Covin and Wales (2012) point out that important conceptual relationships undermining these scales, including the unit of analysis (firms or individual) or differences between formative or reflective measurements are often glossed over, undermining the theoretical basis of the work. Highlighting the importance of carefully constructed and validated scales the authors conclude that different published measures of

[1] Google-scholar shows well over 400 scholarly articles employing entrepreneurial orientation

EO actually examine different phenomena. Thus, failure to carefully measure and understand the application and validation of the scales we employ serves to seriously undermine our scholarly work in entrepreneurship and in the field of management.

There are many reasons scholars might misuse scales or utilize inadequately validated measures. They may rely primarily on previously published work – that itself inaccurately estimates the reliability and validity of the measures employed. As our research capabilities improve, so should our measures, keeping pace with both technological and theoretical advances. Alternatively, scholars may attempt to modify existing scales for reasons of convenience with unintended results. As Hinkin (1995) points out, correctly developing new measures is a complicated, delicate and time-consuming task. Unfortunately, many entrepreneurship researchers have developed their own ad hoc scales, often by selecting items and subscales from various constructs as they see fit without providing evidence of acceptable construct validity. Nonetheless, these same researchers often address substantive research and policy issues using results based upon these decidedly faulty analyses (Pierce et al., 1989). In this study, we address one important potential cause of these contradictory findings in the entrepreneurship attitudes and intentions literature: the improper use of scales without proper validation and justification.

One of the surprising discoveries of our review, discussed in detail below, was that many publications in the entrepreneurial attitudes and intentions fields contain improper (or non-existent) validation techniques[2]. We argue that item development and scale validation should be viewed as a continuous process that goes beyond the initial conceptualization and development of the scale (Bagby, Parker & Taylor, 1994). Thus we contribute to the entrepreneurship attitudes and intentions research by assessing and refining the pioneer

[2] A couple of notable exceptions of scholars that have recently made efforts to refine and improve the constructs and measures used in intentional models include Liñán & Chen (2009) and Thompson (2009).

entrepreneurship attitudes measure conceptualised and developed by Kolvereid (1996a; 1996b). Our study reveals that although the Kolvereid scales are highly cited, the 33-item measure has *never* been subjected to empirical factor analyses and construct validation despite Kolvereid's call to do so.

Our goal in this paper is thus to assess and refine, via accepted scale validation techniques, Kolvereid's scales toward becoming sufficiently parsimonious while maintaining acceptable statistical properties. As such, we believe that this is the first study specifically designed to answer Kolvereid's (1996b) call to validate his measures. Further, the importance of scale validation research in the entrepreneurship field cannot be overstated, particularly in light of the fact that previous research has determined that low-rigor designs, including studies that use poorly validated measures, may be overestimating the relationship between antecedent and outcome variables (Hunter & Schmidt, 2004; Martin et al., 2013).

Thus it might be that previously determined statistical relationships between entrepreneurial attitudes and their purported outcomes, namely intentions, could be called into question because they are partially based upon findings from improperly validated measures. Put differently, despite the breadth and depth of the literature spanning two decades that frequently assesses the impact of interventions designed to impact or change participant attitudes toward entrepreneurship, we may still know very little about the impact of such interventions. Furthermore, it is generally accepted that short, simple survey measures greatly enhance the user-friendliness, face validity, and opportunities for higher response rates (Wellbourne, Johnson & Erez, 1998). Therefore, by employing standard scale validation techniques, we are also answering a growing call (e.g., Martin et al., 2013; Rideout & Gray, 2013) to increase the methodological rigor of entrepreneurship research in general and entrepreneurship attitudes/intentions research in particular.

As a relatively new field, entrepreneurship has grown rapidly with the prospects that it brings economic growth, innovation, and employment opportunities. Both courses and endowed research chairs have shown remarkable growth world-wide (Katz, 2003). Commensurate with this growth has been a call for entrepreneurship research to examine the range of variables that help explain entrepreneurial processes (Shane & Venkataraman, 2000). While the institutional demands for faculty to study these processes in top tier journals has increased monotonically world-wide, the available publication slots for highly cited journals have barely changed in the past few decades, with only a handful recognized as top tier (Stewart & Cotton, 2013). The result of increasing competition for limited publication space places a high premium on the reduction of risk and the preservation of existing scholarly sub-communities, intensifying the use of previously published scales and measures. Journal acceptances are more easily assured when a scholar reinforces another potential reviewer's published work. Questioning the validity of scholarly work is hardly a path to speedy publication, and replication studies including critical methodological examinations are generally frowned upon by top tier journals that focus on theoretical contributions (Honig, Lampel, Siegel & Drnevich, 2014; Hubbard, Vetter & Little, 1998). Unfortunately, this produces a side effect of discouraging systematic scholarly debate and validation. We hope that this article represents a growing trend whereby editors will increasingly consider the academic merits of conducting rigorous validations of some of our most cited scales.

## THEORETICAL FRAMEWORK AND LITERATURE REVIEW

### Entrepreneurial Intentions Research: A Brief Overview

Although the entrepreneurial intentions literature has a relatively short period of development, it is extensive. Much of it can be traced back to Shapiro's entrepreneurial event model (EEM; Shapero 1975, Shapero & Sokol, 1982). In EEM, a person's intent to launch a new venture is influenced by perceived desirability, perceived feasibility, and propensity to

act. These variables are presented as direct antecedents to entrepreneurial intentions. The model assumes that people are motivated by individual factors, situational factors, and social-cultural inheritance, including negative events, information or displacements such as job loss, financial support, and ethnic background (Shapero & Sokol, 1982). Shapero suggested that an individual's propensity to act entrepreneurially would be indirectly influenced by their background, previous experiences, prior work and exposure to entrepreneurship, as well as the existence of role models (Peterman & Kennedy, 2003).

Later, the theory of planned behaviour (TPB; Ajzen, 1991) was employed in entrepreneurial intentions research, positing that entrepreneurial attitudes would predict entrepreneurial intentions, which would in turn predict entrepreneurial behaviours, such as nascent gestation behaviours, which might include, for instance, seeking investment opportunities (Rideout & Gray, 2013). In TPB, overall attitudes are comprised of attitudes towards the behaviour (entrepreneurship), subjective norms, and perceived behavioural control. It is expected that all three attitudinal variables should relate positively to entrepreneurial intentions.

Drawing from both EEM and TPB, Krueger and his associates (e.g., Krueger, 1993; Krueger & Carsrud, 1993; Krueger & Brazeal, 1994; Krueger et al., 2000) examined how intention formation depends on attitudes toward the target behaviour that, in turn, reflect beliefs and perceptions (Krueger & Carsrud, 1993). In this context perceived desirability and perceived feasibility are the antecedents to the intention of becoming self-employed. In turn, perceived subjective norms are the antecedent to perceived desirability, while perceived self-efficacy (drawing from the work of Bandura, 1977) is expected to predict perceived feasibility.

Building on these seminal works, the entrepreneurial intentions literature has grown substantially (Liñán & Fayolle, 2015), with more than 100 papers published each year over

the past five years. To capture the trends in the field, Fayolle and Liñán (2014) reviewed the literature and identified five broad categories of research in the field: (1) theorizing and/or analysing methodological issues on the core EI model; (2) analysing the role of personal-level variables in the configuration of EI; (3) examining the interrelationship between entrepreneurship education and the EI of students/participants; (4) the effect of institutions and context on EI, and (5) the entrepreneurial process and the intention–behaviour link. Further, the findings from a recent meta-analysis have suggested that the relationships between the EI and attitudes towards the behaviour, subjective norm, perceived behavioural control and entrepreneurial self-efficacy are all positive and statistically significant (Schlaegel & Koenig, 2014).

Although TPB and EEM show similar statistical significance, Krueger (2009) has argued that the more parsimonious TPB model is easier for researchers to adopt in their studies. To this end (and central to our study), we observe that the majority of empirical studies published to date use different models, constructs, scales, and variables. This makes it difficult to use the extant literature to draw robust conclusions about the development of intentions to become an entrepreneur and behaviours related to launching a new business venture (Fretschner & Weber, 2013; Martin et al., 2013). Hence, Krueger (2009) cautioned that while the results of current research appear robust, findings might appear strong because of an underlying dynamic process where intent influences attitudes which influence intent; a reciprocal causation. Indeed, findings from all three recent reviews (Krueger 2009; Martin et al., 2013; Schlaegel & Koenig, 2014) suggest there is an urgent need to pay greater attention to measurement properties, and increase both methodological rigor and empirical precision in order to advance the literature.

**The Need to Revisit 'Established' Scales**

*A special tool is created for attaching and detaching certain hard-to-reach parts on the engines of some car models of one manufacturer. Over time, a number of mechanics discover*

*that the tool's shape and design make it useful in dealing with other problems on other cars, and the ways the tool is used quickly multiply. A tool company notices the increasing use of the unusual tool and decides to make its own version. The company borrows several copies of the original from various mechanics for benchmarking purposes. To their surprise, none of the borrowed tools look or work the same. They have been twisted, bent, and ground down to adapt them to other car repair problems* (Lane, Kokka & Pathaak, 2006: 835).

We view this quote to be representative of what is currently happening in the entrepreneurship literature, especially regarding the use – or more aptly, the improper use – of existing scales. Though it is promising that many entrepreneurship scholars are following 'bricolage' techniques in their research by adapting scales to fit their needs, we maintain that the final outcome is not what entrepreneurship scholarship needs. In the pursuit of quick turnaround times at various peer-reviewed outlets, the pressure continuously grows for researchers to provide evidence that justifies their own policies, resources, and academic theorizing. It sometimes leads researchers to fail to provide evidence of acceptable construct validity of their measures; however, their research is often cited to address substantive research and policy issues (Pierce et al., 1989; Malhorta & Grover, 1998). In this section of the paper we present evidence and scholarly views from three research domains, spanning more than four decades, through which we argue in favour of proper scale validation and higher methodological rigor employed in empirical studies more generally.

First, in the human resources/organizational behaviour domain, Muchinsky's (1977) review of empirical studies on employee absenteeism revealed that scholars did not engage with many scale (re)validation techniques. The results were compelling and showed that the conflicting findings both within and between studies could be attributed to the operational and methodological confusion surrounding the reliability and validity of various absenteeism measures. In a similar vein, Tharenou (1979) called for the validation of several measures on organizational psychology and specifically the employee self-esteem constructs. Her extensive review revealed that only a fraction of the studies in the field used scales of sufficient reliability and validity. Furthermore, external and independent validation of scales

was extremely rare, making it virtually impossible to compare the results of the different studies.

Second, in the childhood development domain, the search for better and more parsimonious measurement instruments resulted in various exploratory and confirmatory factor analyses on the most frequently used and most cited measure in the preschool classroom at the time, the Early Childhood Environment Rating Scale-Revised (ECERS-R; Harms, Clifford, & Cryer, 1998). For instance, Perlman, Zellman and Le (2004) revealed that small subgroups of items provided information that was very similar to the information generated by administering the full ECERS-R instrument, which contained 43 items measured across seven subscales. The shorter scale also had the added benefit of being less resource intensive to score and administer. Further, utilizing a large sample of 1,313 classrooms, Cassidy et al. (2005) also argued in favour of a more parsimonious, streamlined and therefore easier to administer measure. Employing factor analytic techniques, the authors developed their own shorter version (16 items across two subscales) of the ECERS-R construct. Moreover, they demonstrated that it could be a relatively effective proxy for the full ECERS-R.

Third and finally, in the marketing domain, Coltman, Devinney, Midgley & Venaik, (2008) recently presented a framework that aimed to assist scholars to design and validate measurement scales. They argued that nearly all published work viewed market orientation, a cornerstone of marketing research, as a one-dimensional construct that relied upon a reflective measurement model (i.e., changes in *'X'* reflects the change in the latent construct *'Y'*, with causality flowing from the latent constant to the indicator). However, as the authors noted, there was still a worrying lack of reliability and validity of the predominant measures of the market orientation variable. Their study revealed that the two main scales that measure market orientation, namely MARKOR (Kohli & Jaworski, 1990) and MORTN (Deshpande &

Farley, 1998), may lack validity. They also provided support for those who argued that improperly validated measurement instruments can reduce the rigor of research, and ultimately of business theory and its relevance for managerial decision-making (Coltman et al., 2008).

In this paper we follow the views of the aforementioned scholars to further argue that the ultimate aim of survey research should be to contribute to theory development by better explaining and/or predicting a particular phenomenon. Unless survey measures have been appropriately validated, entrepreneurship scholars cannot effectively build upon their prior work. Further, the frequent lack of methodological rigor diminishes the value of the entrepreneurial attitudes literature to both scholars and practitioners alike (Malhorta & Grover, 1998). Among other things, it lowers the likelihood that other scholars will, for instance, apply existing knowledge to educational interventions.

It is also worth noting that entrepreneurship courses are currently delivered in many forms in various educational settings across the world (Piperopoulos & Dimov, 2014). To ensure consistent and accurate results, it is important to harmonize and standardize the survey methods used in entrepreneurship education research. This requires a continuous process of validation, refinement, and reduction.

As part of this process our aim in this paper is to begin to establish a set of validated, reliable, and parsimonious measures that can be adopted by entrepreneurship researchers around the world. We argue that although the resulting shortened measure can be better used to collect data in a standardized, reliable, and valid manner compared to its longer form, it should be consistently revisited – and revalidated – in the future. We now turn to a review of the literature on entrepreneurial attitudes in entrepreneurship education and the use (and misuse) of Kolvereid's scales.

**Importance of Attitudes in Entrepreneurship Education**

In this study, we focus specifically on the relationship between entrepreneurial attitudes and their purported outcomes, particularly entrepreneurial intentions. Indeed, attitudes toward entrepreneurship are an important element of many intentional models in the literature (e.g., Kolvereid, 1996a, 1996b; Krueger, Reilly & Carsrud, 2000; McGee, Peterson, Mueller & Sequeira, 2009). For example, it has been proposed that attitudes are predictors of intentions to become an entrepreneur and that those intentions, in turn, predict entrepreneurial behaviours (Ajzen, 1991; Thompson, 2009). Thus, via intentions, attitudes provide the initial causes of behaviour. These causes, in turn, demonstrate the enactment of a decision. This makes attitudes important because they are viewed as early stage antecedents in a causal chain that is expected to predict actual entrepreneurial behaviours (Gollwitzer, 1993). Further, attitudes are especially valuable in this chain because they are understood to be malleable (Olson & Zanna, 1993; Souitaris et al., 2007). This suggests that interventions, such as entrepreneurship education and training programs, can change attitudes in ways that will increase intentions to become an entrepreneur and actual business creation (Piperopoulos & Dimov, 2014).

According to the extant literature there are three antecedents of intentions - *subjective norms*, *perceived behavioural control*, and *attitudes* (Ajzen, 1991; Kolvereid 1996a). Our examination of the literature indicates that scales developed and tested for subjective norms and perceived behavioural control have adequate reliability and validity and are parsimonious enough to be used efficiently in a variety of research contexts. However, this is not the case with some of the existing measures of attitudes toward entrepreneurship, including the Kolvereid (1996a) measure.

Although there have been many empirical studies of entrepreneurial attitudes (e.g. Peterman & Kennedy, 2003; Athayde, 2009), they fail to provide the clarity and consistency

of findings that would be expected of such a sizable body of work. Hindered by methodological concerns and weaknesses (Mullen, Budeva & Doney, 2009; Martin et al., 2013), these studies may actually *undermine* the promise that intentions models have for predicting entrepreneurial behaviours. This is particularly important because the links between attitudes and intentions, and between intentions and behaviour, are supported in various other fields, such as education and psychology (Ajzen, 1991; Armitage & Conner, 2001). However, there is only mixed support for these relationships in the entrepreneurship domain (Katz, 1990). We show that due to construct and measurement differences, one-off modifications to existing scales, and inadequate justification for scale selection, we can partially explain why studies in the entrepreneurship education domain have produced inconsistent results.

**Kolvereid's Entrepreneurial Attitudes Scale**

Studying a sample of Norwegian Business School graduates, Kolvereid (1996a) developed a list of 11 different reasons students had for either self-employment or organizational employment. Five reasons (security, social environment, work load, avoid responsibility and career) related to a person's preference for organizational employment, and six (economic opportunity, challenge, autonomy, authority, self-realization and participate in the whole process) related to a person's preference for self-employment. Kolvereid suggested that security, workload, and autonomy are the three most important reasons for peoples' employment status preferences (1996a).

In early examinations of the scale, Kolvereid (1996b) found it to be a valid and reliable predictor of self-employment intentions. All five self-employment reasons correlated as expected with self-employment intentions, with autonomy ($r$ = .32), authority ($r$ = .31), social environment ($r$ = -.25), self-realization ($r$ = .20), and security ($r$ = -.15). Further, reliability coefficients were acceptable, ranging from a low of .68 for economic opportunity

to a high of .90 for authority. As well, the correlation between the overall attitude measure and self-employment intention was .45, and all 11 reasons were correlated with self-employment intentions in the expected directions.

Tkachev and Kolvereid (1999) investigated self-employment intentions among students from three universities in Russia, with results supporting the view that entrepreneurial attitudes can accurately predict employment status choice intentions. They found some reliability concerns, with alphas for economic potential of only .50 and authority of .53, but consistent with previous findings, the reasons with the strongest correlation with self-employment intentions were autonomy ($r$ = .30), authority ($r$ = .24), self-realization ($r$ = .16), and social environment ($r$ = -.14). Further, for 10 of the 11 reasons the correlations were in the expected direction, with the career variable the only exception.

Kolvereid and Isaksen (2006) argued that the more important autonomy, authority, self-realization and economic opportunity were for people in their choice of employment status, the more positive their attitude was toward self-employment. In order of magnitude, the authors found that these reasons related to self-employment intentions as follows: autonomy ($r$ = .07); authority ($r$ = .13); self-realization ($r$ = 21.); economic opportunity ($r$ = .11). The correlations were all in the expected directions.

To shed light on whether entrepreneurship education increases the intention to become self-employed, Souitaris et al. (2007) employed all 33-items of Kolvereid's attitudes scale in their study of entrepreneurship education, and found that 11 factors with eigenvalues greater than 1.00 emerged, supporting the dimensionality of Kolvereid's scale as originally proposed. Although the authors did not separate their results by each of the 11 reasons, the overall attitude towards self-employment variable was positively and significantly correlated to intention to become self-employed ($r$ = .42 at Time 1 and $r$ = .40 at Time 2).

Other researchers have found similar results (see Table 1 for a summary of these findings). For example, Kautonen, Luoto and Tornikoski (2010) found that the overall attitude measure was strongly related to the intention to become self-employed measure ($r$ = .44). The literature also provides some insight into the reliability of the individual factors (reasons) of the attitude scale, with Kautonen, Tornikoski and Kibler (2011) reporting reliability coefficients ranging from .65 (economic opportunity) to .75 (authority and autonomy). Kautonen, van Gelderen and Tornikoski (2013) reported reliability coefficients ranging from .63 (economic opportunity) and .67 (security) to a maximum of .79 (authority and autonomy). Similarly, Kibler (2013) reported reliability coefficients of .80 for a factor combining authority and autonomy, and self-realization favouring self-employment and .72 favouring security.

Finally, Fayolle and Gailly (2015) used a 32-item version of Kolvereid's scale grouping these items into seven reasons: job security, work load, social milieu, professional and financial perspectives, need for challenges, autonomy, and the need for creative projects. The reliability coefficient of the overall scale was .84. Furthermore, although the authors did not report separately the results of the correlations for each of the seven reasons with self-employment intentions, the overall attitude measure's correlations suggested a positive and strong relation with the intention to become self-employed (Time 1: $r$ = .38; Time 2: $r$ = .43; Time 3: $r$ = .41).

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Insert Table 1 about here

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This review of past studies suggests that Kolvereid's (1996a; 1996b) entrepreneurial attitude measure is a relatively strong predictor of self-employment intentions in several countries across the globe, that there is some concern for the reliability of the economic

opportunity factor and that both the data and theory suggest that four factors: autonomy; authority; self-realization; and economic opportunity are candidates for further development.

***Alternatives to Kolvereid's (1996) Attitudes Measures.*** Our literature review uncovered at least two attempts to address the need for shorter, more parsimonious attitudes scales in the entrepreneurship literature. First, using as a sample 832 female entrepreneurs in the U.S., Gundry and Welsch (2001) investigated the differences between high-growth-oriented and low-growth-oriented entrepreneurs. The authors measured entrepreneurial attitudes using a 'commitment to the success of the business' scale. They defined this variable as 'entrepreneurial intensity,' or the degree to which entrepreneurs are willing to exert maximum motivation and effort towards the success of their venture (Gundry & Welsch, 2001). They hypothesized that commitment would be positively related to entrepreneurial growth intentions. Four items loaded on entrepreneurial intensity (e.g. 'my business is the most important activity in my life') and four items on opportunity costs (e.g. 'I would rather own my own business than pursue another promising career'), with both scales exhibiting acceptable reliability.

The authors' findings further suggested that the mean scores of the two scales measuring commitment successfully predicted the high-growth-orientation or low-growth-orientation of the sampled entrepreneurs. Nevertheless the authors were explicit with the potential limitations of their measurements and therefore suggested, "future work may also be done to examine the convergent and discriminant validity of the scales used in this study" (p. 467). Unfortunately, to the best of our knowledge, this work has not yet been undertaken.

Second, in a sample of 519 individuals from Spain and Taiwan, Liñán and Chen (2009) developed an entrepreneurial attitudes scale. Although this addressed the lack of parsimony, Liñán and Chen's attitudes scale has also not, to date, been validated by additional research. More importantly, there are potential collinearity concerns between

Liñán and Chen's attitudes scale and their intentions measure. Their own analysis indicated that three of the five attitudinal items had correlations of .70 or greater with entrepreneurial intentions (Liñán & Chen, 2009: 604). Further, the path coefficients between the two aggregated scales were as high as .68 (Liñán & Chen, 2009). These results suggest a possible lack of divergent validity between Liñán and Chen's attitudes and intentions scales. Nevertheless we need to highlight that Liñán & Chen measure entrepreneurial intentions and determination to start-up a business in the future (2009: 613), whereas Kolvereid's scale distinguishes between organizational employment and self-employment (own one's own business). Although subtle this is an important difference as '*the intent to own one's own business is clearly a more encompassing concept than just the intention to create a new venture*' (Shook, Priem & McGee, 2003: 386). Despite the differences Liñán & Chen's (2009) intentions scale itself has demonstrated acceptable properties in its subsequent use in the literature, including this paper.

Further development and validation work on these two scales is certainly advisable. However, the Kolvereid scales are popular and have not yet been properly examined. For those reasons we have chosen to undertake an extensive, theory-driven validation of their statistical properties.

## METHOD

### Participants and Procedure

Data were collected as part of a long-term, extensive examination of entrepreneurship education at the university/college level. Initiated in 2010, the project has, to date, gathered the participation of more than 2,000 students from about 100 colleges/universities across the globe. For this study, data were collected from 880 English-speaking business students from seven Canadian universities. The average age of the respondents was 21 years and a slight

majority of them, 55%, were male. All data were collected electronically and respondents were rewarded for their participation.

**Measures**

Measures of attitudes and intentions all utilized a five-point Likert-type scale.

***Reasons for becoming organizationally-employed (ROE).*** We used Kolvereid's (1996b) ROE scales. Participants were asked "the extent to which the following factors are important for your decision about your future career plans." Five factors were examined: Security, two items, Cronbach's α = .88; workload, five items, Cronbach's α = .72; social environment, two items, Cronbach's α = .72; avoid responsibility, three items, Cronbach's α = .77; career, two items, Cronbach's α = .77.

***Reasons for becoming self-employed (RSE).*** We used Kolvereid's (1996b) RSE scales. Participants were asked "the extent to which the follow factors are important for your decision about your future career plans." Six factors were examined: Economic opportunity, three items, Cronbach's α = .83; challenge, four items, Cronbach's α = .62; autonomy, four items, Cronbach's α = .87; authority, two items, Cronbach's α = .81; self-realization, four items, Cronbach's α = .81; participate in the whole process, two items, Cronbach's α = .84.

***Intentions for becoming self-employed.*** Intentions were measured using a five-item scale developed by Liñán and Chen (2009), Cronbach's α = .93. Sample item: "I am very interested in setting up my own business soon."

## RESULTS

**Correlations amongst Study Variables**

The means, standard deviations, and correlations amongst the primary study variables are presented in Table 2.

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*Insert Table 2 about here*

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**Confirmatory Factor Analysis (CFA)**

To assess optimal data fit we ran a CFA of the original eleven-factor model proposed by Kolvereid. Results indicated that the model had a modest fit to the data ($X^2$/df = 5.07, NFI = .84; CFI = .87, RMSEA = .07). Although there is no single "magic number" for distinguishing between good and bad models, a Comparative Fit Index (CFI) of below .90 is commonly accepted as too low, indicating a need for model specifications in line with theoretical considerations (Hair et al., 2014). Also, some standardized loadings were small, suggesting less than optimal construct validity (Gerbing & Anderson, 1988).

To improve the fit of the model to our data, we removed items with standardized regression weights less than .50 and 'singlets' (factors with only one item, of which there was one) from our analyses. Next, we examined standardized residuals, with high values indicating large differences between the specified measurement model and the observed covariance between the respective items (Hair et al., 2014). Per convention, we also removed items with a consistent pattern of large standardized residuals of 2.5 or larger (absolute values).

We next removed the challenge factor, in its entirety, for two reasons. First, from a theoretical point of view, a challenging, exciting and motivating job might be found in self-employment as well as in paid employment. Secondly, the standardized residuals for the four items of this factor were consistently high, especially in relation to the 'work load' items, indicating a conceptual overlap. Next, we split the self-realization factor into two separate factors because, again, the pattern of standardized residuals suggested that it was not unidimensional. Also, as a theoretical argument, self-realization does not necessarily have to take the form of being creative or creating something, as measured by two items. As a result, we created one factor called 'self-realization' that consisted of two items, and another we

called ‘creativity’. These actions are consistent with previously established scale development protocol (Hair et al., 2014).

After dropping these items, the fit of our model was re-estimated. Results indicated that the reduced model had a good fit to the data ($X^2$/df = 2.39, NFI = .95; CFI = .97, RMSEA = .04). We took this as evidence that the model’s fit had been improved by removing the items described above as well as deleting – and, in the case of creativity, creating – entire factors.

In the next step we ran a structural equation analysis with entrepreneurial intentions as the dependent variable. Three of the ten factors were significantly related to the intentions variable in the expected direction. Only the self-realization variable demonstrated a relationship with intentions that was inconsistent with the expected direction.

We further examined the self-realization construct and its theoretical suitability as an indicator of a positive attitude toward self-employment. On reflection, we found that the two items used to represent self-realization—“Self-realization” and “To realize your dreams”—do not necessarily align more favourably with either self-employment or organizational employment. In this context self-realization represents achieving ones full ability, potential or “dreams”. We found that a person could view achieving his/her full potential as becoming the best accountant or soccer player or ballet dancer, see that as a very important consideration when deciding his/her future career path, and yet have no proclivity toward self-employment. Although we can understand why Kolvereid would have been interested in these items, given the lack of a clear theoretical link with reasons for choosing self-employment, and data that supported this view, we decided to eliminate this construct from the model.

We then ran the model again including only three factors: workload, autonomy, and creativity. The results (standardized path coefficients) are shown in Figure 1. The fit of this truncated model was satisfactory ($X^2$/df = 10.40, NFI = .91; CFI = .92, RMSEA = .10). A

confirmatory factor analysis of the three-factor model (i.e. without the entrepreneurial intentions measure) exhibited a very good model fit ($X^2$/df = 5.10, NFI = .96; CFI = .97, RMSEA = .07).

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*Insert Figure 1 about here*
---

Finally, because we substantially changed and shortened the model compared to its original form, we ran confirmatory factor analyses on data from another sample of English-speaking students from the U.S. ($N$ = 222). A slight majority of these respondents, 59%, were male and the mean age was 22 years. The means, standard deviations, and correlations amongst the primary study variables for this sample are presented in Table 3.

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*Insert Table 3 about here*
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We observed a very good model fit in the U.S. sample: $X^2$/df = 2.11, NFI = .94; CFI = .97, RMSEA = .07. As such, the shortened scale had a good fit to data from two separate English-speaking samples from our dataset (see Figure 2 for a full list of items in the shortened scale). The theoretical and practical implications of these findings are discussed below.

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*Insert Figure 2 about here*
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## DISCUSSION

The entrepreneurship literature has evolved dramatically over the past two decades, but the methods and measures we employ, in many cases, have not kept pace. Although our empirical work in this paper focuses on the entrepreneurial attitudes scale specifically, we argue for a more holistic review of methods and measures in the entrepreneurship literature. Using the theory of planned behaviour (TPB; Ajzen, 1991) as a case in point, we highlight

the broader need for ongoing development and testing of methods and measures. Fishbein and Ajzen's (1975) original theory of reasoned action put forth a relatively simple model, proposing that attitudes and subjective norms directly impact intentions, which in turn directly impact behaviours. Over time, through continuous testing and development TPB was created, proposing that attitudes, subjective norms and perceived behavioural control directly impact intentions, and that intentions and perceived behavioural control directly impact behaviours. Along with this more developed version of the theory came continual refinements in measures, with, for instance, Ajzen (1991) testing alternative scaling options, and Ajzen and Driver (1991) testing the impact of evaluative versus affective attitudes measures. Thus, the measures evolved in line with the evolution of the theory and new empirical knowledge of the phenomena. We argue that this continual review, re-assessment and refinement of measures and methods is needed in the entrepreneurship literature. In this paper we provide an example of the value of such work.

The misuse of scales, not properly validated and assessed for reliability, represents an Achilles heel of entrepreneurship scholarship. Developing accurate scales is a process fraught with potential errors. For example, common method variance suggests that using the same sample for both scale development and construct validity is inappropriate; separate independent samples are required (Hinkin, 1995). Completing just this one extra, essential step is both complicated and time consuming. The type of methodological research demonstrated in this study should be an ex-ante foundation for further empirical examination, not a post examination commentary or critique. Unfortunately, the increasing pressure on entrepreneurship scholars world-wide to publish in top tier journals not only incentivizes expedient decision making, but also reifies the importance of statistical measures and techniques over accuracy and substantive content (Honig, 2014).

More specifically, although attitudinal models of entrepreneurship development appear to hold promise for understanding the antecedents to entrepreneurial behaviour, methodological weaknesses in the entrepreneurship literature have, to date, inhibited our ability to measure and interpret these relationships appropriately and rigorously build upon prior research findings. For example, our literature review revealed that a commonly cited set of attitudes scales in the field (Kolvereid, 1996a, 1996b) has never been properly validated. As a result we cannot be sure that the results of the studies on entrepreneurship attitudes to date have been accurate, especially because a large number of those involved researchers selecting items on an apparently ad hoc basis. We argue that these practices may undermine the value of many otherwise informative studies and, in an effort to help improve empirical rigor, undertook a rigorous validation and scale reduction exercise.

Employing confirmatory factor analyses, structural equation modelling, and references to existing theory, we have identified and validated a three-factor, eight-item instrument that we have named the 'mini-Kolvereid' scale (see Figure 2). Our testing included an examination of the mini-Kolvereid measure's predictive and convergent validity on Liñán and Chen's (2009) entrepreneurial decision scale, showing strong validity across this outcome measure. Implications of these findings are discussed below.

**Potential Limitations**

Prior to elaborating the implications of our study, we first discuss two limitations that should be noted. One limitation of this study relates to the judgment calls that researchers routinely face while conducting scale validation techniques and/or factor analytic research in general. For example, we eliminated 'singlets' and items with low regression weights to improve the fit of our model. However, while we agree with Cronbach's (1970) classic assertion that "there is no one 'right' way to do a factor analysis any more than there is a 'right' way to photograph Waikiki Beach" (p. 315), we have followed the best available

methods and protocol for our evaluation of Kolvereid's measure. For example, the selection of our factors was driven by both conceptual and statistical considerations. We began with a set of factors whose selection was initially guided by theory and previous conceptual development. The final set of factors was ultimately chosen based upon their fit to the data drawn from two separate samples in two different countries.

Another limitation is that we cannot make final claims about the generalizability of the scale until the measure is subjected to further validation procedures, particularly between non-English speaking and non-student populations across the globe. We therefore take the stance of Bagby et al. (1994) and Malhorta and Grover (1998) who assert that item development and scale validation should be viewed as a continuous process that goes beyond the initial conceptualization and development of a particular scale. There is currently a dearth of such work in the entrepreneurship literature, due at least in part to the fact that many top ranked journals are less likely to reward a scale validation (or a study replication) with a publication, compared to studies that have been deemed to be 'larger scale.' Whatever the reason, it is our hope that by conducting this type of research, and more effectively making the case that it will improve the rigor and relevance of our research, this tide will soon start to turn in our field's highest impact journals. In our view, any step toward validating our attitudes measures - or *any* measure - is a good first step. We believe that we have provided that step for the Kolvereid entrepreneurship attitudes scale.

**Theoretical Implications**

Attitudes toward entrepreneurship are an important element of intentional models because they are understood to be early stage antecedents in a causal chain that is expected to predict actual business creation (Shapero & Sokol, 1982; Ajzen, 1991). The fact that attitudes are understood to be malleable (Olson & Zanna, 1993; Souitaris et al., 2007) also suggests that interventions such as educational courses can change attitudes in ways that may make

individuals more likely to pursue and achieve business creation. Thus, entrepreneurship scholars, educators and public policymakers will benefit from these efforts to improve our ability to undertake rigorous empirical examinations of attitudinal measures.

It is our contention that, as a result of our efforts, future research will be able to more parsimoniously and accurately measure the relationship between attitudes and intentions, at least compared to our current capabilities. This has important theoretical implications, particularly in terms of the validity of the constructs used in entrepreneurship education research. Specifically, we have improved the validity of the measure, removing many redundant and unrelated items from its original 33-item form. This will allow future researchers to more accurately predict and measure the relationships between entrepreneurial attitudes and intentions.

Our scale incorporates three career-choice related factors from the original 11 developed by Kolvereid, and we found that all three related to the entrepreneurial intentions variable in the expected directions: Workload was significant and negative; autonomy was significant and positive; creativity was significant and positive.

**Practical Implications**

The most obvious practical implication of this research is that our efforts have produced a leaner and more parsimonious entrepreneurial attitudes measure, with eight items comprising three components compared to its original form with 33 items comprising 11 components (Kolvereid, 1996b). This is important because, in our own research experience (and the anecdotal experiences provided by several of our colleagues), the sheer length of Kolvereid's original attitudes measure has often prohibited its use. At 33-items, it can make an otherwise short survey overly long and unwieldy, leading to high levels of participant fatigue.

Research in a variety of fields has clearly demonstrated that shorter, validated versions of existing measures can provide similar, if not better, statistical properties as the original longer versions (e.g., Wellbourne et al., 1998; OECD, 2005; Donnellan, Oswald, Baird & Lucas, 2006). Indeed, this is true even if the original measures have acceptable statistical properties. This may be due to the fact that participant attention and interest is maintained at a better rate on short forms than on longer forms (Rathod & LaBruna, 2005).

**Future Research**

The development of parsimonious, properly validated scales, such as the mini-Kolvereid scale we have validated here, opens up many possibilities for further research. Although much of that research should be future-focused, we begin with a call to revisit the past. As a first order of business we encourage entrepreneurship scholars, especially those trained in the use of meta-analytic techniques, to examine the impact of the use of bespoke, un-validated measures in studies designed to inform our understanding of the antecedents of entrepreneurial behaviour and the creation of new businesses. Two recent meta-analyses in the field demonstrate the value of moderator analyses to parse out the impact of important methodological decisions, such as rigor in study design (Martin et al., 2013) and measurement choice (Schlaegel & Koenig, 2014). We note that both of these meta-analyses include many of the studies that we have found, via our literature review, to use piecemeal and un-validated scales. We encourage researchers to re-look at past studies and conduct moderator analyses with a view to distinguishing the impact of the quality of measures used.

Regardless of the outcomes of such further meta-analyses, the importance of validation more generally is understood, and such validation is best viewed as an iterative, ongoing process (e.g., Wellbourne et al., 1998). Thus, additional research is required to further test the mini-Kolvereid scale for evidence of sustained reliability and validity. We note, however, that the results of such studies may diminish the effect sizes found. Until such

time that we have the kind of meta-analytic understanding of scale validation impact called for above, we can use only our current, indirect knowledge of the validation impact, which indicates that lower rigor studies in this field have the tendency to overestimate statistical relationships (Martin et al., 2013). Thus results of past studies correlating untested attitudes scales with intentions scales may well have overestimated these relationships. It is possible, then, that our development and validation of the mini-Kolvereid scale may lead to results that show weaker relationships than previously found. Nevertheless meta-analytic analyses of all variables used commonly in the EI literature, combined with systematic validation to ensure generalizability of the mini-Kolvereid scale, will allow us to move forward knowing that we are building new knowledge on a firm foundation.

Looking forward, we see a number of research areas that open up as a result of having a more parsimonious and validated attitudes scale. First, as a matter of priority we encourage researchers to build on Schlaegel and Koenig's (2014) learning by developing rigorous studies that test their integrated TPB EEM model, using the newly validated mini-Kolvereid measure that we have developed here as the attitudes scale. It will be important to include both student and non-student samples in this work, as there is evidence that results generally, and effect sizes specifically, vary across these two broadly defined populations (e.g. Schlaegel and Koenig, 2014). Adding learning from several rigorous studies of this sort, drawn from samples in divergent countries, holds promise for moving our understanding of the antecedents to entrepreneurial behaviour ahead considerably.

The creation and adoption of validated, parsimonious scales also allows us to move forward in examining hypothesized but understudied phenomena that are critical to gaining a comprehensive understanding of entrepreneurial intention formation and development. For instance, Krueger (2009), building on Bagozzi and Warshaw (1990), shows the need to examine the dynamic aspects of entrepreneurial intentions development. There is reason to

expect that constructs that we assume to be only antecedents of intentions, such as attitudes, may have a more reciprocal relationship, whereby attitudes impact intentions, and the modified intentions impact attitudes. Having more parsimonious and validated attitudes scales allows future research to explore these reciprocal relationships, with greater likelihood of discerning these more complex relationships. Learning in this area could provide important knowledge for entrepreneurship scholars generally, but especially for entrepreneurship education scholars and practitioners who need to better understand which elements of the entrepreneurial development models have the greatest impact on helping to create more and better future entrepreneurs.

**Concluding Remarks**

Examining the validity of previously published scholarly work is not a typical path to publication in the management field (Honig, Lampel, Siegel & Drnevich, 2014; Hubbard, Vetter & Little, 1998). We think this produces a side effect of discouraging systematic scholarly debate and validation. In this paper we have, for the first time in the entrepreneurship literature, validated a set of popular attitudes scales. We hope that this article becomes part of a growing trend whereby our field's top journals take into account the validity of measures in an iterative, dynamic way. The value of such work is that, via a constant process of validation, both theory and practice are better informed on an ongoing, continuous basis.

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**TABLE 1**
**Sample Characteristics, Reliability Coefficients and Correlations with Self-Employment Intentions of Kolvereid Scale (1996a; 1996b)**

| Author(s) | Sample | Number of Employment Reasons Used per Study (11 Total) | Reliability Coefficients | Correlation Attitude Measure and Self-Employment Intentions |
|---|---|---|---|---|
| Kolvereid (1996a) | 128 students in Norway | All 11 reasons | Lowest: Economic opportunity (.68)<br>Highest: Authority (.90) | .45 |
| Tkachev & Kolvereid (1999) | 512 students in Russia | All 11 reasons | Overall scale: N/A<br>Lowest: Economic potential (.50)<br>Authority (.53)<br>Highest: Promotion (.89) | .33 |
| Kolvereid & Isaksen (2006) | 297 entrepreneurs in Norway | Economic opportunity, authority | Overall scale: N/A<br>Lowest: Economic opportunity (.70)<br>Highest: Autonomy and authority (.82)<br>Overall scale: N/A | .33 |
| Souitaris, Zerbinati & Al-Laham (2007) | 250 students in the UK and France | All 11 reasons | Pre-test (t1)<br>Lowest: Work load (.72)<br>Economic opportunity (.73)<br>Highest: Security (.86)<br>Career (.86)<br><br>Post-test (t2)<br>Lowest: Authority (.70)<br>Economic opportunity (.73)<br>Highest: Challenge (.88) | Pre-test: .42<br>Post-test: .40 |
| Kautonen, Luoto & Tornikoski (2010) | 785 prime age (20-49) and third age (50-64) adults in Western Finland | Authority, autonomy, self-realization, economic opportunity, security, avoid responsibility | Overall scale: N/A<br>Lowest: Self-realization (.68)<br>Security (.69)<br><br>Highest: Authority maximum of 0.74 (authority and autonomy) | .44 |

| | | | | |
|---|---|---|---|---|
| | | | Overall scale: N/A | |
| Kautonen, Tornikoski & Kibler (2011) | 496 adults (aged 45-64) in Western Finland | Authority, autonomy, self-realization, economic opportunity | Lowest: Economic opportunity (.65)<br>Highest: Authority and autonomy (.75) | .43 |
| Kautonen, van Gelderen & Tornikoski (2013) | 117 adults (aged 18-64) in Western Finland | Authority, autonomy, self-realization, economic opportunity, security, avoid responsibility | Overall scale: 0.81<br>Lowest: Economic opportunity (.63)<br>Security (0.67)<br>Highest: Authority and autonomy (.79) | .33 |
| Kibler (2013) | 834 adults (aged 18-64) in Western Finland | Authority, autonomy, self-realization, security<br>\ | Overall scale: N/A<br>Lowest: Security (.72)<br>Highest: Authority and autonomy, and self-realization (combined) (.80) | .34 |
| Fayolle & Gailly (2015) | 158 university students in France | Job security, work load, social milieu, professional & financial perspectives, need for challenges, autonomy, need for creative projects | Overall scale: .77 (5 reasons)<br>Lowest and highest per reason/index: N/A<br>Overall scale: .84 | Pre-test: .38<br>Post-test #1: .43<br>Post-test #2: .41 |

**TABLE 2**
**Correlations amongst Primary Variable: Canadian Sample**

| | N | M | SD | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. Security | 880 | 4.39 | .73 | | | | | | | | | | | |
| 2. Workload | 880 | 3.27 | .71 | .37** | | | | | | | | | | |
| 3. Social Environment | 880 | 3.91 | .79 | .18** | .18** | | | | | | | | | |
| 4. Avoid Responsibility | 880 | 1.95 | .80 | -.05 | .36** | -.10** | | | | | | | | |
| 5. Career | 880 | 4.65 | .60 | .35** | .06 | .27** | -.26** | | | | | | | |
| 6. Economic Opportunity | 880 | 4.01 | .60 | .19** | .07* | .25** | -.14** | .42** | | | | | | |
| 7. Challenge | 880 | 4.41 | .60 | .19** | -.01 | .42** | -.31** | .38** | .46** | | | | | |
| 8. Autonomy | 880 | 3.89 | .70 | .04 | .13** | .21** | -.12** | .16** | .37** | .46** | | | | |
| 9. Authority | 880 | 4.16 | .70 | .11** | .03 | .27** | -.27** | .35** | .43** | .49** | .59** | | | |
| 10. Self-Realization | 880 | 4.00 | .77 | .06 | .06 | .28** | -.18** | .24** | .39** | .52** | .60** | .53** | | |
| 11. Participate in Whole Process | 880 | 3.54 | .86 | .10** | .16** | .25** | -.08* | .15** | .34** | .34** | .41** | .32** | .52** | |
| 12. Intent | 880 | 2.89 | 1.12 | -.20** | -.08* | -.00 | -.05 | -.08* | .14** | .15** | .48** | .29** | .41**` | .24** |

* p < .01,
**p< .001

**TABLE 3**

**Correlations Amongst the Primary Variables: U.S. Sample**

| | N | M | SD | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|---|---|
| **1. Workload** | 222 | 3.36 | .77 | (.76) | | | |
| **2. Autonomy** | 222 | 3.76 | .75 | .013 | (.79) | | |
| **3. Creativity** | 222 | 3.85 | .95 | -.11 | .43** | (.87) | |
| **4. Intent** | 222 | 3.00 | 1.18 | -.20** | .42** | .27** | (.93) |

Note: $p < .001$**, Cronbach's alphas for each variable are found on the diagonal (in brackets).

**FIGURE 1**

**Structural Equation Model for Three Component Model**

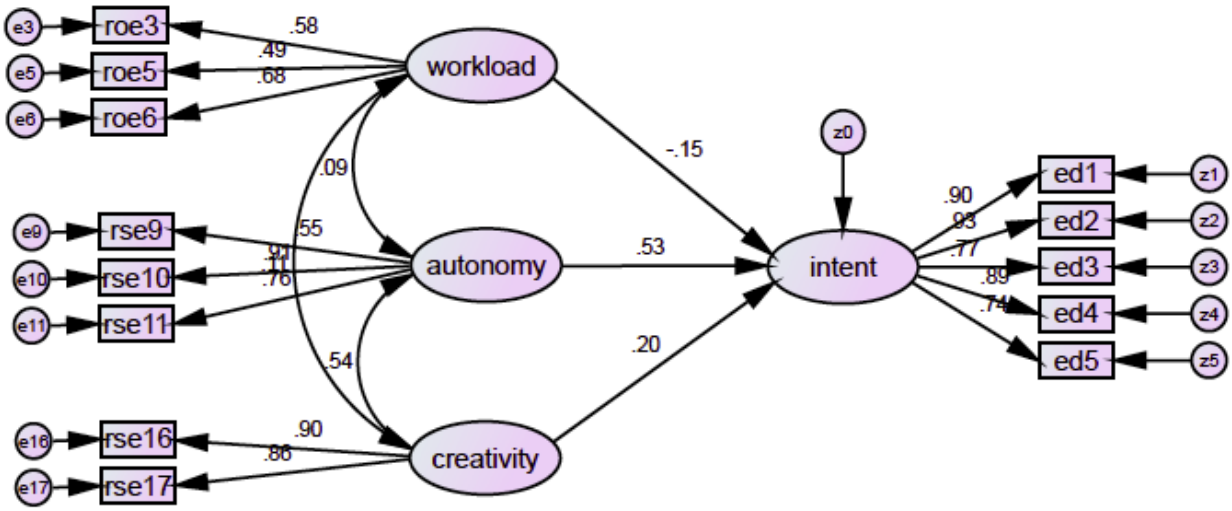

**FIGURE 2**

**The Mini-Kolvereid Scale**

**Instructions:**
Using the scale below, please indicate the extent to which the following factors important for your decision about your future career plans.

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| Strongly disagree | Disagree | Neutral | Agree | Strongly agree |

**Component 1: Workload**

1. Not having long working hours
2. To have fixed working hours
3. Not to have a stressful job

**Component 2: Autonomy**

1. Independence
2. To be my own boss
3. To be able to choose my own work tasks

**Component 3: Creativity**

1. To create something
2. To fulfil my creative needs