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Career Decision Ambiguity Tolerance Scale: Construction and Initial Validations

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We would like to express our gratitude to Judith Homer and Liang Liao for their valuable feedback regarding the initial items. This project was supported by the Office of the Vice-President for Research and Economic Affairs, the Graduate Research Support Program, and Graduate Education at Arizona State University. Correspondence should be addressed to Hui Xu, Counseling & Counseling Psychology, MC-0811, Arizona State University, Tempe, AZ, 85287-0811 (huixu5@asu.edu).

January 19, 2015

Abstract

The Career Decision Ambiguity Tolerance Scale (CDAT) measures individual evaluations of and responses to ambiguity encountered in career decision making. It was developed and initially validated through two studies of college students. An exploratory and confirmatory factor analysis consistently showed a three-factor structure for career decision ambiguity tolerance, consisting of preference, tolerance, and aversion. In addition to support for construct validity and subscale reliabilities, the findings also support the scale's incremental validity in predicting career indecision, career decision-making self-efficacy, and career adaptability over and beyond general ambiguity tolerance. The theoretical meaning and practical application of the CDAT was discussed along with its limitations and suggestions for future research.

Key words: Ambiguity Tolerance, Career Decision, Instrument Development, Factor Analysis, Incremental Validity

Career Decision Ambiguity Tolerance Scale: Construction and Initial Validations

Career decision making has been proposed to involve processes of collecting information about the self and the world of work and using that information to identify a matching educational or vocational choice (e.g., Holland, 1997; Parsons, 1909; Sampson, Lenz, Reardon, & Peterson, 1999). However, individuals hardly ever have clear and unequivocal career information. Many times the information is ambiguous or simply unavailable at the moment of decision. Therefore, a key variable in career decision making is the ability to deal with this ambiguity. While there have been studies supporting the salient role of general ambiguity tolerance in career decision making (Xu & Tracey, 2014a, 2014b), there has been little research investigating tolerance with the ambiguity specifically encountered in career decision making. This domain-specific ambiguity tolerance is expected to be more closely associated with the career decision making process and thus could better predict career decision making outcomes. However, an instrument specifically measuring this construct is not available. The goal of the current study was to construct a career decision ambiguity tolerance scale and examine its validity.

Ambiguity Tolerance in Career Decision Making

An ambiguous situation is one which individuals cannot adequately structure or categorize (Budner, 1962). Ambiguity tolerance (AT) has been defined as the way individuals evaluate and respond to ambiguous situations or information characterized by an array of unfamiliar, complex, or inconsistent clues (Budner, 1962; Furnham & Ribchester, 1995). According to Furnham and Ribchester (1995), people with low levels of ambiguity tolerance tend to experience stress, react prematurely, and avoid ambiguous information, while those with high ambiguity tolerance perceive ambiguous situations/information as desirable and interesting and do not deny or distort the complexity of incongruity.

Ambiguity tolerance is certainly a salient individual characteristic in the career decision making process as a key aspect of this process is dealing with unfamiliar, complex, or inconsistent information. There has been empirical evidence indirectly or directly supporting the positive link of ambiguity tolerance with career decision making. Endres, Chowdhury, and Milner (2009) found support for the link of ambiguity tolerance with self-efficacy in a complex decision task, suggesting that ambiguity tolerance is a positive attribute in ambiguous decision making situations. Xu and Tracey (2014b) reported that ambiguity tolerance negatively predicted different areas of career indecision directly when controlling for amount of career exploration regarding the self and the world of work. Xu and Tracey (2014a) have also demonstrated that ambiguity tolerance was positively linked to career decision-making self-efficacy. Thus, previous research supports the idea that ambiguity tolerance is an important factor and merits clinical attention in career intervention.

However, the lack of a measure specific to the career decision-making domain prevents further research on ambiguity tolerance. A domain-specific measure of ambiguity tolerance should capture some unique variance in career decision making that cannot be accounted for by general ambiguity tolerance. Therefore, the present study constructed a scale to measure the domain-specific career decision ambiguity tolerance and initially validated this scale.

Construct of Career Decision Ambiguity Tolerance

Based on Budner’s (1962) tripartite model of ambiguity tolerance (i.e., tolerance for unfamiliar, complex, or inconsistent information), the construct of career decision ambiguity tolerance is defined as people’s evaluations of and responses to unfamiliar, complex, or inconsistent information in career decision making. Individuals with high levels of career decision ambiguity tolerance tend to be comfortable with the uncertain information during the process of career decision making and find it interesting and even desirable, while individuals with low levels of career decision ambiguity tolerance tend to find the uncertain information in career decision making anxiety-provoking and choose to avoid it or react prematurely.

Unfamiliar information in career decision making refer to situations in the career decision making process in which information encountered is new to decision makers (Budner, 1962). Typically career decision making involves a career exploration process (Parsons, 1909; Super, 1994), where individuals collect information regarding their attributes and the potential work corresponding to their interests. It is likely that they could encounter new information about either the self or the world of work in this process that they have not realized or heard before. Another source contributing to unfamiliarity is the need for learning new decision making skills. This situation happens more frequently with individuals new to career decision making, as they might have no prior experiences with making important decisions for their life. However, even experienced career decision makers could face challenges when their life circumstances shift dramatically and they cannot simply apply the familiar used decision making formula.

Complex situations in career decision making refer to situations in the career decision making process in which there are a great number of different and connected information to be taken into account simultaneously (Budner, 1962). Multiple aspects of information have been proposed by vocational psychology to be considered in career decision making (Dawis & Lofquist, 1984; Sampson et al., 1999), such as interests, skills/competence, values, job requirement, and salary/benefits. Individuals not only need to gather extensive information, they are also expected to organize, evaluate, and make sense of the information in order to make a reasonable career decision. In addition, the career decision making process may not be linear and straightforward. The complexity of this process is also exhibited in the component of implementation, monitoring, and adjustment of their career choice (Sampson et al., 1999). This component could be especially salient in the current rapidly changing world, as people will more easily find their previous choice not adaptable to the life circumstance.

Inconsistent information in career decision making refer to situations in the career decision making process in which different information suggests different or even contradictory career routes (Budner, 1962). Different aspects of information in the career decision-making process could easily contradict each other. For example, individuals could be confused with the interests in both independent work and social interaction-intense work. They are also likely to find other people's evaluations of the potential career choice differ. They might even find that the meaning of the information could vary depending on the criteria or perspective. Additionally, as the informational technology advances, individuals are gaining increasing access to the information needed. However, it is also becoming more challenging for individuals to assess the validity of information and make sense of different information among the multiple sources. While the information collected is inconsistent with each other, a single and simple solution to career decision making cannot easily result.

In addition to these three sources of career decision ambiguity, the fourth category of unpredictability of the future was proposed based on Germeijs and De Boeck's (2003) career indecision model and Dequech (2000)'s essay on fundamental uncertainty. Germeijs and De Boeck (2003) posited the role of insufficient information about the alternatives, valuation problems, and uncertainty about the outcomes in career indecision. While insufficient information and valuation problems are associated with complexity and inconsistency in the regard of ambiguity, uncertainty about the outcomes depicts the importance of unpredictability with the future. An unpredictable future, which implies multiple possible trajectories of a particular career choice, could easily make it difficult to structure or categorize situations in career decision making. Individuals might be hesitant with a career choice due to the ambiguous prospect of that career. They could also attribute the indecisiveness to the concern for the possible change of their personalities. Unfortunately, the information about the future is not always available at the decision making moment and the future is yet to be created, which is described as fundamental uncertainty by Dequech (2000). The indeterminacy of the future is especially salient in the more dynamic modern society, which emphasizes the adaptability of individuals rather than the stability of a vocational choice (Savickas & Porfeli, 2012).

While ambiguity tolerance has been revealed to be associated with career indecision and career decision-making self-efficacy (Xu & Tracey, 2014a, 2014b), we proposed in the current study that career decision ambiguity tolerance could additively predict career indecision and career decision-making self-efficacy over and beyond general ambiguity tolerance. It is plausible that career decision ambiguity tolerance could capture unique variance in the career decision-making process and outcome, as it is focused on the specific career decision-making process. Adding to the incremental validity of career decision ambiguity tolerance is its additive association with career adaptability. Savickas and Porfeli (2012) have defined career adaptability to be a construct denoting the capacity that a person may draw upon to "solve the unfamiliar, complex, and ill-defined problems presented by developmental vocational tasks, occupational transitions, and work traumas" (pp. 662). Thus, individuals with a high level of career decision ambiguity tolerance are expected to have a high level of career adaptability. This positive link was proposed to be additive to the one between ambiguity tolerance and career adaptability as argued before.

Overview of the Present Study

The Career Decision Ambiguity Tolerance Scale (CDAT) was developed and its validity was examined in the current study. The scale was designed to specifically measure individuals' evaluations of and responses to ambiguous information in career decision making, which are characterized by the four sources of novelty, complexity, inconsistency, and unpredictability. Given the specificity of CDAT with respect to the career decision-making process, it was hypothesized that CDAT additively predicts career indecision (Hypothesis 1), career decision-making self-efficacy (Hypothesis 2), and career adaptability (Hypothesis 3) over and beyond ambiguity tolerance (AT). A follow up study examined the stability of the CDAT.

Study 1: Scale Construction and Initial Validation

Based on the review of the literature of ambiguity tolerance and career decision making, we generated items intended to measure an individual's tolerance for ambiguity arising from the four sources of novelty, complexity, inconsistency, and unpredictability. We also drew upon our career counseling experiences to inform item writing. We generated 68 items, with 17 items for each dimension. Following Worthington and Whittaker (2006)'s suggestion, we had several experts evaluate the items for content validity and clarity. The experts consisted of one licensed clinical supervisor working at a university counselor training center, one counseling psychology faculty member who is certified by American Board of Professional Psychology, and one advanced counseling psychology doctoral student who has abundant career research and intervention experience. An item pool of 52 items with 13 from each source was then selected for further empirical examination.

Method

Sample

The current dataset consisted of 328 undergraduate students recruited from a southwest state university. They ranged in age from 18 to 44 (M = 19.07, SD = 2.00). Of the sample, 48.8% were male (n=160), 50.6% were female (n=166), and .6% were self-identified as transgender (n=2). In terms of race/ethnicity, 7.6% (n=25) were African American/Black, 10.4% (n=34) were Asian/Asian American, 14.6% (n=48) were Latino (a)/Hispanic, 57.9% (n=190) were Caucasian/White, .6% (n=2) were Native American, 7.9% (n=26) were Multiracial, .9% (n=3) were self-identified as others. In terms of major, 79.3% (n=260) were students in an major exploratory program participating in major exploration or university orientation classes, while the other 20.7% (n=68) were students from a variety of majors participating in a career development course.

This dataset was randomly split into two samples. One consisting of 150 students was utilized for the Exploratory Factor Analysis (EFA). They ranged in age from 18 to 44 (*M* = 19.15, *SD* = 2.40). Of this sample, 50.0% were male (n=75), 49.3% were female (n=74), and .7% were self-identified as transgender (n=1). In terms of race/ethnicity, 8.7% (n=13) were African American/Black, 10.7% (n=16) were Asian/Asian American, 14.0% (n=21) were Latino (a)/Hispanic, 59.3% (n=89) were Caucasian/White, and 7.3% (n=11) were Multiracial.

The other sample consisting of 178 students was reserved for the Confirmatory Factor Analysis (CFA). They ranged in age from 18 to 28 (*M* = 18.99, *SD* = 1.58). Of this sample, 47.8% were male (n=85), 51.7% were female (n=92), and .6% were self-identified as transgender (n=1). In terms of race/ethnicity, 6.7% (n=12) were African American/Black, 10.1% (n=18) were Asian/Asian American, 15.7% (n=28) were Latino (a)/Hispanic, 56.2% (n=100) were Caucasian/White, 1.1% (n=2) were Native American, and 8.4% (n=15) were Multiracial.

Measurement

The Multiple Stimulus Types Ambiguity Tolerance Scale–II (MSTAT–II). The MSTAT-II (McLain, 2009) is a 13-item measure designed to measure an individual’s tolerance for situations that are unfamiliar, insoluble, or complex (Budner, 1962). The MSTAT-II measures the participants’ degree of ambiguity tolerance based on five stimulus types: ambiguous information in general, complex information, uncertain information, new/unfamiliar/novel information, and insoluble/illogical/internally inconsistent information (e.g., “I try to avoid situations that are ambiguous” and “I prefer familiar situations to new ones"). Items would be rated on a 5-point Likert scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). Higher scores indicate higher ambiguity tolerance. McLain (2009) reported the Cronbach's alpha of .83. Xu and Tracey (2014b) reported an alpha coefficient of .76. Validity evidence of high correlations with other common ambiguity tolerance measures and risk taking propensity and low correlation with social desirability were reported as well (McLain, 2009). An alpha estimate of .82 was obtained using the current sample.

The Career Decision Self-Efficacy-Short Form (CDSE-SF). The CDSE-SF (Betz, Klein, & Taylor, 1996) is a 25-item measure designed to assess the self-efficacy for five skill domains viewed as crucial for effective career decision-making (Crites, 1978). These five domains consist of (a) accurate self-appraisal (e.g., "Accurately assess your abilities"), (b) gathering occupational information (e.g., "Use the internet to find information about occupations that interest you"), (c) goal selection (e.g., "Choose a career that will fit your preferred lifestyle"), (d) making plans for the future (e.g., "Make a plan of your goals for the next five years"), and (e) problem solving (e.g., "Change majors if you did not like your first choice"). Responses would be scored on a 5-Likert scale ranging from 1 (*no competence at all*) to 5 (*complete competence*). The internal consistency alpha for the CDSE-SF has ranged from .93 to .94 (Betz & Luzzo, 1996). There is an extensive body of data supporting the validity of CDSE-SF (e.g., Betz & Luzzo, 1996), including its significant correlations with career indecision, fear of occupational commitment, career maturity, and career exploratory behaviors. The current data revealed an alpha coefficient of .94.

The Career Decision-making Difficulty Questionnaire (CDDQ). The CDDQ was developed based upon Gati and his colleagues' taxonomy of career decision-making difficulties (Gati, Krausz, & Osipow, 1996). The 10-item Lack of Readiness (LR) scale measures career indecision due to inhibiting cognition or persoanlity (e.g., "It is usually difficult for me to make decisions"). The 12-item Lack of Informtion (LI) scale measures career indecision due to information deficit (e.g., “I find it difficult to make a career decision because I still do not know which occupations interest me”). The 10-item Inconsistent Information (II) scale measures career indecision due to informational conflicts (e.g.. “I find it difficult to make a career decision because I have contradictory data about the existence or the characteristics of a particular occupation or training program”). Participants were asked to rate on a 9-point Likert-type scale ranging from 1 (*does not describe me*) to 9 (*describes me well*). Gati, Osipow, Krausz, and Saka (2000) reported the alpha coefficients as .68, .86, and .85 for the LR, LI, and II scales respectively. Xu and Tracey (2014a) found the alpha coefficients of .65, .96, and .93 for the LR, LI, and II scales respectively. Osipow and Gati (1998) found a strong positive association of the CDDQ with the Career Decision Scale and a strong negative association of the CDDQ with the Career Decision Self-Efficacy Scale, providing evidence for the validity of the CDDQ. The current study found the alpha coefficients of .74, .96, and .94 for the LR, LI, and II scales respectively.

Career Adapt-Abilities Scale-USA Form (CAAS). The CAAS (Porfeli & Savickas, 2012) is a 24-item scale designed to measure an individual’s resources for coping with current and anticipated developmental vocational tasks, occupational transitions, or work traumas (Savickas & Porfeli, 2012). The 24 items are divided equally into four subscales measuring the four adapt-ability resources and self-regulation strategies of concern, control, curiosity, and confidence (Savickas & Porfeli, 2012). Savickas and Porfeli (2012) conceptualized the adaptable individual as (a) being concerned about the vocational future (e.g., “thinking about what my future will be like”), (b) taking control of the preparation process for one's vocational future (e.g., “taking responsibility for my actions”), (c) displaying curiosity by exploring possible selves and future scenarios (e.g., “investigating options before making a choice”), and (d) strengthening the confidence to pursue one's aspirations (e.g., “overcoming obstacles”). Participants responded to each item based on a

5-Likert scale ranging from 1 (*not strong*) to 5 (*strongest*). Higher scores indicated higher career adapt-abilities. Porfeli and Savickas (2012) reported alpha coefficients of .82, .80, .84, and .80 for the subscales of concern, control, curiosity, and confidence respectively and an alpha coefficient of .94 for the CAAS total scale. The concurrent validity of the CAAS has been supported in the findings of consistent associations of the four subscales with career commitment, career exploration, and career reconsideration (Porfeli & Savickas, 2012). The current sample revealed alpha coefficients of .84, .86, .89, and .90 for the subscales of concern, control, curiosity, and confidence respectively and an alpha coefficient of .95 for the CAAS total scale

Procedure

College students participating into major exploration, university orientation, or career development courses were invited to participate in this study as an extra credit opportunity. Voluntary participants filled a demographic questionnaire and the package of research instruments online. All the individual responses were kept as anonymous and confidential through analysis. According to the setting of the online survey, participants were required to answer all items before they can move to the next part. Participants were informed that they can freely withdraw from this study at any time and 16 (4.9%) did so after completing the CDAT .

Analysis

The first half of the sample was used in an exploratory factor analysis to establish and shorten the instrument and the structure was then confirmed using confirmatory factor analysis on the second half the sample. Among many EFA approaches, we selected the Maximum Likelihood (ML) based EFA as this approach provides more fit indices and a better handling of data missing (Fabrigar, Wegener, MacCallum, & Strahan, 1999). Among multiple EFA models with different factor numbers, we chose the optimal one based on the following criteria. The root mean square error of approximation (RMSEA) and the standardized root mean square residual (SRMR) were below the cutoff of .08 as suggested by Hu and Bentler (1999) and the Bayesian Information Criterion (BIC) was minimum among model variations (Kuha, 2004).

After determining the appropriate number of factors, we examined the loadings and chose the best items as defined as those with the greatest factor loadings and minimal cross loadings. The Geomin rotation which has been shown to outperform traditional rotation approaches (Browne, 2001) was employed to generate factor loadings for the oblique factor structure. As the last step of EFA, we named each factor based on the loading matrix generated in the Geomin rotation.

The final version of the CDAT was then subject to CFA using data from the second half of the sample, where we examined and compared different model variations in order to find the optimal data representation. The fit of the models were evaluated using the criteria of robust chi-square, CFI, RMSEA, and SRMR. Among them, RMSEA and SRMR would be chosen as the primary indices as recommended by Hu and Bentler (1999). The RMSEA was especially useful in the current study as it takes model complexity into account, while the CFI is affected by sample size and model complexity (Marsh, Balla, & McDonald, 1988). With the purpose of making the statistical tests robust to non-normality, we adopted the robust maximum likelihood parameter estimation.

To examine the incremental validity of the CDAT, we employed the Hierarchical Multiple Regression (HMR) with the AT as the baseline prediction model and the different factors of the CDAT added into this baseline model at the second step. There were three sets of criteria related to career decision making in our hierarchical regressions. The first set involved career decision-making self-efficacy. As the previous research (e.g., Chaney, Hammond, Betz, & Multon, 2007) has demonstrated the single-factor structure the CDSE-SF, we calculated the mean score of the total CDSE-SF as the dependent variables. The second set of criteria involved career indecision. As the research has demonstrated that career indecision is a multidimensional construct (e.g., Brown et al., 2012; Gati et al., 1996), we adopted the mean score for each subscale of the CDDQ as the dependent variables. The third set of criteria involved career adaptability. As the previous research (Porfeli & Savickas, 2012; Savickas & Porfeli, 2012) showed a hierarchical structure of the CAAS, we employed the mean scores of the four subscales of the CAAS as the dependent variables.

Results

Table 1 summarized the fit indices of all EFA and CFA models. As can been seen by the value of BIC (25958.13) and the values of RMSEA (.078) and SRMR (.062), the three-factor EFA model had the lowest BIC and the RMSEA and the SRMR both reached the "adequate" level. Therefore, we thought a three-factor structure could represent the data adequately and parsimoniously. To gain another indication of the number of factors, we performed a parallel analysis with 1000 replications and found that when using a .95 cutoff, there were six factors. While the parallel analysis indicated a six-factor structure, the factor loadings revealed that three of them were relatively weakly measured by only 4-5 items. We therefore elected to stick to the three-factor model.

After deleting items with no significant loadings on any factor, we then chose six items for each of the three factors which had a strong factor loading and minimal cross-loadings. Table 2 showed the items for the final 18-item CDAT and its loading structure, descriptive statistics, and the alpha coefficients for its subscales. The three factors were *preference* characterized by interest and excitement for ambiguity in career decision making, *tolerance* characterized by tolerance and acceptance of ambiguity in career decision making, and *aversion* characterized by avoidance and difficulty with ambiguity in career decision making.

In the CFA on the second sample, we examined and compared five competing models of one-factor model (only one general factor), three-factor orthogonal model (three unrelated factors), three-factor oblique model (three related factors), the four-factor hierarchical model (one second-order factor manifested by three first-order factors) and the four-factor bi-factor model (one general factor with three specific factors). As can be seen by the values of RMSEA (.119 and .085 respectively) and SRMR (.12 and .16 respectively), the one-factor model and the three-factor orthogonal model fit the data poorly. As can be seen by the values of RMSEA (.070) and SRMR (.08), the three-factor oblique model and the four-factor hierarchical model fit the data adequately. While the four-factor bi-factor model was found to fit the data adequately, as indicated by the RMSEA (.065) and the SRMR (.08), its BIC (10692.51) was larger than that of the three-factor oblique model and the four-factor hierarchical model. In addition, the loading pattern revealed that the aversion factor collapsed with the general factor, suggesting factor over-extraction. This result was consistent with the item-level EFA that a three-factor structure was optimal for the current data. While the three-factor oblique model and the four-factor hierarchical model were empirically equivalent in terms of model fit, we preferred the latter one as it was more conceptually parsimonious. Therefore, the four-factor hierarchical model was endorsed as the final model representing the CDAT structure.

Table 3 showed the means, standard deviations, and correlations of variables that entered HMR analysis. We calculated the mean scores of the three CDAT subscales representing the three factors (i.e., preference, tolerance, and aversion). Table 4 showed the results of HMR on career decision-making self-efficacy, career indecision, and career adapt-abilities. As can be seen by the significant ΔF test results across criteria, the three dimensions of CDAT additively predicted career decision-making self-efficacy ($\Delta F(3,315)=23.20$, $P < .05$), career indecision- lack of readiness ($\Delta F(3,307)=15.74$, $P < .05$), career indecision-lack of information ($\Delta F(3,307)=28.93$, $P < .05$), career indecision-inconsistent information

($\Delta F(3,307)=33.71$, $P < .05$), career adaptability-concern ($\Delta F(3,307)=5.47$, $P < .05$), career adaptability-control ($\Delta F(3,307)=9.16$, $P < .05$), career adaptability- curiosity ($\Delta F(3,307)=5.82$, $P < .05$), career adaptability-confidence ($\Delta F(3,307)=5.79$, $P < .05$) over and beyond general ambiguity tolerance. The incremental validity of CDAT was thus supported well by the current study.

Study 2: Test-Retest Reliability Estimates

Information regarding the test-retest reliability of the CDAT was examined in Study 2.

Sample

The sample of this study consisted of 40 undergraduate students recruited from a southwest state university, who had also participated in Study 1. They ranged in age from 18 to 27 (M = 19.68, SD = 1.82). Of the sample, 47.5% were male (n=19), 50.0% were female (n=20), and 2.5% were self-identified as transgender (n=1). In terms of race/ethnicity, 2.5% (n=1) were African American/Black, 10.0% (n=4) were Asian/Asian American, 15.0% (n=6) were Latino (a)/Hispanic, 65.0% (n=26) were Caucasian/White, 5.0% (n=2) were Multiracial, 2.5% (n=1) were self-identified as others. In terms of major, 75.0% (n=34) were students in an major exploratory program participating in major exploration or university orientation classes, while the other 15.0% (n=6) were students from a variety of majors participating in a career development course.

Procedure

College students who participated into the first study were invited to participate in this study after two weaks as an opportunity to win a gift card. Voluntary participants filled a demographic questionnaire and the CDAT developed in the first study online.

Results

This study found alpha coefficients of .79, .69, and .83 for the three subscales of CDAT respectively (i.e., preference, tolerance, and aversion). The test-retest reliability coefficients over the two-weak interval were .69, .59, and .78 respectively for the three subscales.

Discussion

The current study developed the Career Decision Ambiguity Tolerance Scale (CDAT) to measure tolerance for ambiguous information specifically encountered in the career decision-making process. In general, while the exploratory factor analysis suggested a three-factor structure based on a college student sample of career guidance needs, the confirmatory factor analysis cross-validated this structure. The results of Hierarchical Multiple Regression also supported the validity of this scale well by looking at its incremental prediction on important criteria of career decision making over and beyond the general ambiguity tolerance.

While the initial CDAT items were selected based on the theoretical four-factor model of career decision ambiguity tolerance (i.e., novelty, complexity, inconsistency, and unpredictability), the empirical data showed that those items did not relate to each other in terms of the specific ambiguity source. Rather, the current result suggested that students perceive career decision ambiguity tolerance based on their responses to it over the ambiguity source. Three factors representing three responses emerged consistently from the exploratory analyses, which were preference, tolerance, and aversion. As can been seen by the respective items, preference emphasizes individual positive appraisal of ambiguous information in career decision making, characterized by excitement and interests for change and new things. The grouped items in this dimension also suggest that individuals' preference for ambiguity in career decision making is largely driven by the new information arising in exploration of self and occupations. Other three sources of ambiguity (i.e., complexity, inconsistency, and unpredictability) rarely elicit this response.

In contrast to preference, tolerance emphasizes individual confidence in coping behaviors when facing ambiguity in career decision making. These two ambiguity responses do not necessarily go hand in hand as the low factor correlation suggested. People could initially find ambiguity in career decision making interesting but later realize his/her incompetence in handing the ambiguous situation. Vice versa, people might be able to solve problems related to ambiguity in career decision making, but they do not necessarily enjoy the process.

The third factor of aversion is distinguished from the previous two as it emphasizes individual negative avoidance to ambiguity in career decision making. However, in theory low avoidance does not necessarily motivate people to approach ambiguity or gain confidence in handling ambiguity in career decision making. Therefore, these three factors stand relatively independent of each other, capturing some unique aspects of how people respond to ambiguity in career decision making respectively. The low inter-factor correlations and the differential prediction pattern in the HMR analysis also spoke to this theoretical proposition. The moderate correlations among these three factors indicate that career decision ambiguity tolerance is multi-dimensional and should not be viewed as a single factor or used in a total score manner. Career decision ambiguity tolerance is thus more nuanced than a simple construct.

Adding confidence to the theoretical and practical meaning of CDAT is its promising incremental prediction on a variety of important career decision criteria. While we hypothesized that the construct of career decision ambiguity tolerance could more closely relate to career indecision, career decision-making self-efficacy, and career adaptability, the current results supported this hypothesis by finding an additive prediction over and beyond the general ambiguity tolerance. This incremental prediction pattern emerged consistently across all subscales of career indecision, career decision-making self-efficacy, and career adaptability, namely career decision-making self-efficacy, career indecision-lack of readiness, career indecision-lack of information, career indecision-inconsistent information, career adaptability-concern, career adaptability-control, career adaptability- curiosity, and career adaptability-confidence. The current results thus suggested that people with a higher career decision ambiguity tolerance would have more career decision-making self-efficacy, less lack of readiness, less lack of information, less inconsistent information, and more concern/control/curiosity/confidence resources in career adaptation. Xu, Hou, and Tracey (2014) have found that information collecting through career exploration alone did not alleviate types of career indecision as much as many career theories expected (e.g., Parsons, 1909; Super, 1994). While the previous research has revealed the significant role of general ambiguity tolerance in career decision making (Xu & Tracey, 2014a, 2014b), the current study further strengthen the idea that how to handle informational ambiguity in career decision making is a critical area in many aspects of this process.

While the present study developed a psychometrically sound career decision ambiguity tolerance scale as can be seen in its satisfactory performance in multiple validity and reliability examinations, the CDAT was developed and examined through college student samples. Therefore, future research is needed in order to examine the psychometrical properties of the CDAT in populations who are facing career decision or transition in their later life. It would be also interesting to see future research investigating the development of career decision ambiguity tolerance, especially exploring programs which can enhance individual career decision ambiguity tolerance. In summary, The CDAT was portrayed by the current study as an important predictor for individual success in career decision making, which calls more attention to the substantive information this scale captures and the important clinical application this scale could have.

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Table 1. Summary of Model Fit Indices for EFA Models.

	χ^2	*df*	*BIC*	CFI	RMSEA		SRMR
					Estimate	90% C. I.	
EFA (n=150)							
1-factor model	3579.48	1274	26792.48	0.41	0.110	[.106, .114]	0.14
2-factor model	2633.27	1223	26101.81	0.64	0.088	[.083, .092]	0.08
3-factor model	2239.06	1173	25958.13	0.73	0.078	[.056, .071]	0.06
4-factor model	2006.83	1124	25971.43	0.77	0.072	[.067, .077]	0.05
5-factor model	1857.17	1076	26062.27	0.80	0.070	[.064, .075]	0.05
6-factor model	1732.31	1029	26172.92	0.82	0.068	[.062, .073]	0.05
CFA (n=178)							
1-factor model	474.62	135	10928.99	0.58	0.119	[.107, .131]	0.12
3-factor orthogonal model	306.77	135	10718.87	0.79	0.085	[.072, .097]	0.16
3-factor oblique model	245.70	132	10662.09	0.86	0.070	[.056, .083]	0.08
4-factor hierarchical model	245.70	132	10662.09	0.86	0.070	[.056, .083]	0.08
4-factor bi-factor model	203.81	117	10692.51	0.89	0.065	[.060, .079]	0.08

Table 2. Factor Loadings for the Final 18-item CDAT

Items	Preference	Tolerance	Aversion
I am interested in exploring the many aspects of my personality and interests	**0.76***	0.32*	-0.03
I am excited that I can learn new things about myself or about the world when making a career decision	**0.76***	0.28*	0.04
I am excited to see a creative way to match my interests with a career	**0.74***	0.30*	-0.03
It is interesting to discover new strengths and weaknesses	**0.65***	0.38*	0.00
I am not interested in knowing new information about myself	**0.56***	-0.17	0.15
I am open to careers which I have never heard of or thought of before	**0.52***	0.32*	0.12
I enjoy tackling complex career decision making tasks	-0.08	**0.69***	0.26*
I am tolerant of the potential difference between my perception and the reality of a career	0.27*	**0.58***	-0.03
I am able to make a choice when multiple options seem equally appealing	0.02	**0.57***	0.22*
I am tolerant of the unpredictability of a career	-0.13	**0.56***	0.14
I am tolerant with the possibility that my interests could change in the future	0.35*	**0.44***	0.02
I do not mind changing my career in the future if necessary	0.05	**0.44***	0.08

I try to avoid complicated career decision making tasks		0.12	0.00	**0.70***
I find it difficult to make career decision as things cannot be predicted clearly		-0.17	0.07	**0.68***
I am afraid of sorting out the complex aspects of a career		0.05	0.05	**0.68***
The career decision making process, which involves so many considerations, is just daunting		0.01	-0.05	**0.65***
I try to avoid a career in which the prospects cannot be foreseen clearly		-0.04	0.03	**0.64***
People's different or sometimes contradictory perspectives about a career makes me uncomfortable		0.09	-0.07	**0.62***
Mean		5.50	4.47	2.89
SD		1.00	.88	1.05
Cronbach α		.83	.70	.81
Eigenvalues		7.09	3.22	10.99
Factor Correlation	Preference	_		
	Tolerance	-0.09	_	
	Aversion	-0.07	-0.05	_

Note. N = 150. **P* < .05

Table 3. Means, Standard Deviations, and Correlations of Variables

	Mean	*SD*	Preference	Tolerance	Aversion	AT	CDSE-SF	LR	LI	II	Concern	Control	Curiosity
Preference	5.50	1.00	1.00										
Tolerance	4.47	0.88	.33**	1.00									
Aversion	2.89	1.05	-.22**	-.34**	1.00								
AT	3.13	0.51	.28**	.44**	-.59**	1.00							
CDSE-SF	3.55	0.60	.25**	.41**	-.39**	.28**	1.00						
LR	4.74	1.23	-.30**	-.29**	.46**	-.40**	-.15**	1.00					
LI	4.42	1.87	-.24**	-.30**	.60**	-.46**	-.42**	.59**	1.00				
II	4.13	1.86	-.31**	-.32**	.58**	-.42**	-.35**	.59**	.85**	1.00			
Concern	3.42	0.79	.13*	.17**	-.27**	.19**	.56**	-.10	-.26**	-.17**	1.00		
Control	3.58	0.80	.22**	.33**	-.32**	.30**	.57**	-.10	-.25**	-.17**	.61**	1.00	
Curiosity	3.43	0.83	.21**	.33**	-.25**	.33**	.49**	-.02	-.14*	-.07	.54**	.66**	1.00
Confidence	3.51	0.79	.16**	.27**	-.30**	.29**	.59**	-.04	-.25**	-.20**	.64**	.72**	.71**

N = 328. AT=MSTAT-II. LR=CDDQ-Lack of Information; LI=CDDQ-Lack of Information; II=CDDQ-Inconsistent Information. **P* < .05.

Table 4. Hierarchical Multiple Regression Results

Step	Variable	*B*	*SE*	β	R^2	ΔF	Step	Variable	*B*	*SE*	β	R^2	ΔF
		CDSE-SF[a]							CAAS-Concern[e]				
Step 1	AT	.33	.06	0.28*	.08	27.45*	Step 1	AT	.29	.09	0.19*	.03	11.06*
Step 2	AT	-.06	.08	-0.05	.25	23.20*	Step 2	AT	.00	.11	-0.00	.08	5.47*
	Preference	.06	.03	0.10				Preference	.04	.05	0.05		
	Tolerance	.20	.04	0.30*				Tolerance	.07	.06	0.07		
	Aversion	-.17	.03	-0.30*				Aversion	-.18	.05	-0.24*		
		CDDQ-LR[b]							CAAS-Control[f]				
Step 1	AT	-.97	.13	-0.40*	.16	59.85*	Step 1	AT	.48	.09	0.30*	.09	31.32*
Step 2	AT	-.33	.15	-0.14*	.27	19.74*	Step 2	AT	.13	.11	0.08	.17	9.16*
	Preference	-.21	.06	-0.17*				Preference	.07	.05	0.09		
	Tolerance	-.10	.08	-0.07				Tolerance	.18	.05	0.20*		
	Aversion	.37	.07	0.32*				Aversion	-.14	.05	-0.18*		

	CDDQ-LI[c]							CAAS-Curiosity[g]				
Step 1	AT	-1.69	.19	-0.46*	.21	82.96*	Step 1	AT	.54	.09	0.33*	.11	38.84*
Step 2	AT	-.47	.22	-0.13*	.39	28.93*	Step 2	AT	.32	.11	0.20*	.16	5.82*
	Preference	-.15	.09	-0.08				Preference	.07	.05	0.09		
	Tolerance	-.10	.11	-0.05				Tolerance	.18	.06	0.20*		
	Aversion	.87	.10	0.49*				Aversion	-.04	.05	-0.05		
	CDDQ-II[d]							CAAS-Confidence[h]					
Step 1	AT	-1.55	.19	-0.42*	.18	67.38*	Step 1	AT	.45	.08	0.29*	.08	28.40*
Step 2	AT	-.20	.22	-0.06	.38	33.71*	Step 2	AT	.16	.11	0.10	.13	5.79*
	Preference	-.30	.09	-0.16*				Preference	.03	.05	0.04		
	Tolerance	-.17	.11	-0.08				Tolerance	.13	.05	0.15*		
	Aversion	.86	.10	0.49*				Aversion	-.14	.05	-0.18*		

N = 328. AT=MSTAT-II. Preference=CDAT-Preference. Tolerance=CDAT-Tolerance. Aversion=CDAT-Aversion.

[a] *df* for ΔF =3, 315; [b-h] *df* for ΔF =3, 307; *$P < .05$