Career Decision Ambiguity Tolerance: A Longitudinal Examination of its Relation to

Career Indecision

by

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A Dissertation Presented in Partial Fulfillment
of the Requirements for the Degree
Doctor of Philosophy

Approved May 2016 by the
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ARIZONA STATE UNIVERSITY

May 2017

ABSTRACT

The current study investigated the dynamic interplay of career decision ambiguity tolerance and career indecision over three assessment times in a sample of college students (n=583). While the previous research has repeatedly shown an association of career decision ambiguity tolerance with career indecision, the direction of this association has not been adequately assessed with longitudinal investigation. It was hypothesized in this study that there is a reciprocal pattern of career decision ambiguity tolerance leading to subsequent career indecision and career indecision leading to subsequent career decision ambiguity tolerance. Using a cross-lagged panel design, this study found support for the reciprocal pattern that aversion with ambiguity led to increased negative experience, choice anxiety, and lack of readiness in career decision making, while negative experience, choice anxiety, and lack of readiness led to increased aversion with ambiguity as well. Additionally, this study revealed that choice anxiety and readiness for career decision making led to increased interests in new information. The key findings were discussed with respect to the theoretical and clinical implications for career counseling along with limitations and suggestions for future research.

DEDICATION

To my mom Jianying Ma, for your love and wisdom

献给我的母亲马剑英女士，感谢您的爱以及智慧

ACKNOWLEDGMENTS

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1 INTRODUCTION

Career decision making is a decision-making process, in which individuals make a choice of their future career. Career decision making has been conceived as an important task in an individual's career development (Holland, 1997; Super, 1990). This developmental task is important as it leads to people's educational choice (e.g., major) and vocational choice (e.g., job), which further allocates individual resources such as time, money, and energy and form the foundation of their future life style. Essentially the significance of career decision making rests upon the scarcity of those individual resources. Because those resources are limited, it is common that people are eager to make a good career decision and strive to invest their resources wisely in order to achieve the maximum outcome of their life.

However, career decision making is not an easy process and people could end up being unable to choose. The status of being unable to make a career choice is defined as career indecision (Brown & Rector, 2008). Career indecision prohibits students from enrolling in a meaningful and an attractive major in college. It also makes people who are facing middle life reinvestment be unable to progress. Therefore, career decision making has always been a central topic for vocational psychology and the earliest guidance model was proposed by Parsons (1909).

Parsons' (1909) model embraces processes of collecting information about the self and the world of work and using that information to identify a matching educational or vocational choice. Although this model was proposed one hundred years ago, it continues to serve the field as a guiding model (e.g., Blustein, 1997; Flum & Blustein, 2000; Zikic & Hall, 2009) and strongly influences the most

subsequent career development theories (Holland, 1997; Sampson, Lenz, Reardon, & Peterson, 1999). The primary emphasis of this model lies on the information gathering process and the matching process. However, this theoretical proposition might not be valid as individuals hardly ever have clear and unequivocal career-related 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.

An ambiguous situation is one which individuals cannot adequately structure or categorize (Budner, 1962). 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 higher levels of career decision ambiguity tolerance are likely to be more comfortable with the uncertain information during the process of career decision making and find it interesting and even desirable, while individuals with lower levels of career decision ambiguity tolerance are more likely to find the uncertain information in career decision making anxiety-provoking and react prematurely or even choose to avoid it.

There has been research consistently finding the association of career decision ambiguity tolerance with career decision-making outcomes (Xu & Tracey, 2014, 2015a; Xu & Tracey, 2015b). While the traditional career guidance is centered around information collecting and matching (Gati, Ryzhik, & Vertsberger, 2013), those studies have additionally emphasized the role of handling ambiguity in career decision making. However, the significant role of handling ambiguity in career decision making has only been supported in cross-sectional studies so far. The

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previous results therefore do not necessarily apply to longitudinal change of career decision-making outcomes. The impact of career decision ambiguity tolerance on the subsequent change of career indecision is a critical question for career intervention that is focused on career decision ambiguity tolerance, as it forms the theoretical foundation of the intervention efficacy. It was anticipated that individuals with higher ambiguity tolerance would exhibit less career indecision subsequently.

In addition to the temporal prediction of career decision ambiguity tolerance on career indecision, the reverse prediction of career indecision on subsequent career decision ambiguity tolerance was important but unexamined in the previous cross-sectional research. While career decidedness has been widely endorsed as societal expectation particularly for adults (Krumboltz, 1992), individuals experiencing career indecision are likely to experience more anxiety (Campagna & Curtis, 2007; Fuqua, Newman, & Seaworth, 1988; Fuqua, Seaworth, & Newman, 1987; Hawkins, Bradley, & White, 1977). Consequently, they would tend to hold a negative evaluation of ambiguity in career decision making and react more anxiously. Therefore, the focus of the current study was to longitudinal investigate the dynamic predictions of career decision ambiguity tolerance and career indecision on each other over time and I hypothesized a reciprocal model.

2 LITERATURE REVIEW

This chapter serves to provide a comprehensive literature review of key

constructs in this study in order to form the theoretical and empirical foundation of the

framework for the study. As such, I review the literature on career indecision and

career decision ambiguity tolerance. Following the review, I conclude the chapter by

providing a summary of the materials reviewed and reiterate the research hypotheses.

Career Indecision Models

Career decision making is a complex process, where individuals commonly find

it difficult to make a choice for a variety of reasons (Gati, Krausz, & Osipow, 1996;

Germeijs & De Boeck, 2003). The construct of career indecision denotes problems

encountered in the career decision-making process that inhibit individuals from

making a career decision (Brown & Rector, 2008; Germeijs & De Boeck, 2003). The

vocational psychology has been investigating this construct for a long history given its

critical meaning to individuals' life-span development (Osipow, 1999). Certainly

making a career choice is one of the most important development tasks for

adolescents and adults based on developmental career models, such as Super (1994)'s

life-span and life-space theory.

There have been several models proposed to depict the sources of career

indecision (e.g., Brown et al., 2012; Chartrand, Robbins, Morrill, & Boggs, 1990;

Gati et al., 1996; Germeijs & De Boeck, 2003; Lent, Brown, & Hackett, 1994; Saka,

Gati, & Kelly, 2008). They vary by construction approach, theoretical emphasis, and

dimensionality.

The Social Cognitive Career Theory (SCCT) (Lent, 2004; Lent & Brown, 2013;

Lent et al., 1994) draws on Bandura's (1977) social cognitive theory and emphasizes

one critical social cognitive construct in career decision making, which is career decision-making self-efficacy. Career decision-making self efficacy describes an individual's belief regarding his or her ability to successfully complete tasks necessary to making career decisions (Betz & Luzzo, 1996; Taylor & Betz, 1983). The association of career decision-making self-efficacy with career indecision was proposed in that individuals with low self-efficacy in career decision making would behave poorly in activities necessary for career decision making and consequently experience more career indecision. This key association is also embedded in a more comprehensive structural picture, embracing environmental and individual antecedents (e.g., prior learning experience and family support) and distal outcomes (e.g., Grade Point Average and major satisfaction).

The SCCT model has driven extensive research examining the hypothesized link of career decision-making self-efficacy with career indecision and consistently found positive results supporting the hypothesis. For example, Taylor and Popma (1990) found in a sample of college students that career decision-making self-efficacy was negatively predictive of career indecision as measured by the Career Decision Scale (CDS). This pattern is even revealed in different cultures. Liu, Hao, and Li (2006) showed that Chinese students who have better career decision-making self-efficacy tended to have less career indecision across all the subscales of the Career Decision-making Difficulty Questionnaire (CDDQ). Summarizing the existing research using a meta-analytic approach, Choi et al. (2012) revealed a large association of career decision-making self-efficacy with career indecision as measured by the CDS. The data are thus consistent and portray a solid picture of the association between career decision-making self-efficacy and career indecision.

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While the SCCT delineates one important factor leading to career indecision, vocational psychologists are still searching for a taxonomy system of career indecision, which could further guide career intervention and improve its effectiveness (Brown & Rector, 2008). There have been two approaches of developing such career indecision models. One is the theory-driven approach, exemplified by Gati and his colleagues (1996)'s Career Decision-making Difficulty Questionnaire (CDDQ). The other one is data-driven approach, exemplified by Brown and his colleagues (2012)'s Career Indecision Profile (CIP).

The CDDQ (Gati et al., 1996) model of career indecision is based on decision making and information-processing theories. Gati and his colleagues (1996) first defined a model of an ideal career decision maker and then defined any deviation from the ideal career decision maker as a potential problem resulting in career decision-making difficulties. Then the various career decision-making difficulties could be categorized into three higher-order domains according to the time when they arise, the sources, the impact on the decision, and the type of required intervention (Gati, 2011; Gati et al., 1996). There has been empirical evidence supporting the structural validity of this proposed taxonomy model (Gati, 2011; Gati et al., 1996).

Contrary to the single dimensional model of career indecision such as that used in the CDS, Gati's multi-dimensional model depicts multiple sources of career decision-making difficulties. It therefore allows for more specific diagnosis of career indecision (Osipow, 1999). The three higher-order domains in Gati's model are (a) lack of readiness, (b) lack of information, and (c) information inconsistency. Lack of readiness refers to the difficulties before the decision-making process, which comprises of the lack of motivation, indecisiveness, and dysfunctional beliefs. The inconsistency and lack of information refers to the difficulties during the

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decision-making process itself. Lack of information comprises of the lack of knowledge about the process, the lack of information about self, occupations, and ways obtaining information. Inconsistent information comprises of unreliable information, as well as internal and external conflicts.

While the CDDQ is mainly focused on the cognitive process of career decision making, the Emotional and Personality Career Difficulties Scale (EPCD) (Saka et al., 2008) depicts the career indecision model focused on the emotional and personality-related aspect of career decision making. The EPCD model proposed three overarching categories of indecision problems, consisting of pessimistic views, anxiety, and self-concept and identity (Saka et al., 2008). The construct validity of the EPCD model was supported in the findings of moderate associations between general indecisiveness, self-esteem, trait anxiety, and identity status with scores of the EPCD (Saka & Gati, 2007). The EPCD scores at the beginning of the academic school year were also found to predict confidence in career choice at the end of the academic school year.

Other than the CDDQ and EPCD models from Gati and his colleagues (Gati et al., 1996; Saka et al., 2008), there are several other theory-driven models of career indecision, such as the Career Factor Inventory (CFI) (Chartrand et al., 1990) and Germeijs and De Boeck's three-factor indecision model (2003). The CFI model proposed a multidimensional system of career indecision, consisting of two information factors (Need for Career Information and Need for Self-Knowledge) and two personal-emotional factors (Career Choice Anxiety and Generalized Indecisiveness) (Chartrand et al., 1990). The structural validity of this model was supported in a confirmatory factor analysis, while the discriminant and convergent validity was evidenced in its association with anxiety,

self-esteem, and vocational identity (Chartrand et al., 1990). Germeijs and De Boeck (2003) proposed a three-factor indecision model derived from decision theory, consisting of being insufficiently informed about the alternatives, valuation problems, and uncertainty about the outcomes. The structural validity of this model was supported in a confirmatory factor analysis and its relation to the constructs on the nomological network was also supported (Germeijs & De Boeck, 2003).

All the aforementioned models received empirical support for their validity in the population of colleague students or high school students. As can be seen, they do not map onto each other exactly. However, there are clear overlaps among these models. Vocational psychology has pursued a theoretically sound indecision model in order to guide differentiated treatments and improve intervention efficacy for decades, but there is unsatisfactory progress in terms of solving inconsistency across models (Brown & Rector, 2008). Kelly and Lee (2002) argued that the discrepancy between the importance of the construct of career indecision and the decline of career indecision research is rooted in the lack of an adequate model of career indecision domains. As complete description of domains of career indecision is prerequisite for an adequate career indecision model and intervention, a data-driven approach exploring underlying factors across theoretical models began to draw attention (Brown & Rector, 2008; Kelly & Lee, 2002).

While different theoretical models emphasize different specific aspects of career indecision, the data-driven approach is focused on exploring underlying general factors. Kelly and Lee (2002) made the first attempt in the literature to conduct a factor analysis on available career indecision measurements with undecided college students. Student responses to measures of three popular indecision models of the Career Decision Scale (Osipow, 1987), the Career Factors Inventory (Chartrand et al.,

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1990), and Career Decision Difficulties Questionnaire (Gati et al., 1996) were subject to an exploratory factor analysis, which revealed a six-factor structure of Lack of Information, Need for Information, Trait Indecision, Disagreement with Others, Identity Diffusion, and Choice Anxiety. They further conducted a cluster analysis to explore the structure of the six indecision domains and found three clusters, consisting of Information Deficit/Identity Diffusion, Decision Process Inhibitors, and Choice Inhibitors.

Kelly and Lee (2002)'s inductive approach based on the primary data is innovative. However, their results could be subject to the sample characteristics in their study. A more powerful empirical approach thus would be to quantitatively synthesize extant correlational matrices including career indecision and variables on a meaningful nomological network. Brown and Rector (2008) meta-analytically revealed a four-factor structure of career indecision based on existing correlation matrices with variables that have been demonstrated to associate with career indecision. Brown and his colleagues (2012) later found more support for the validity of this model via primary analysis based on original inter-item correlation matrix and secondary analysis based on correlation matrices used to test Gati and his colleague's cognitive model of career indecision (Gati et al., 1996) and emotional/personality model of career indecision (Saka et al., 2008). The final four-factor model of career indecision based on this data-driven approach consisted of neuroticism/negative affectivity (NN), choice/commitment anxiety (CC), lack of readiness (LR), and interpersonal conflicts (IC). The labeling of the four factors could be difficult as they are describing quite broad domains of career indecision. In general, neuroticism/negative affectivity describes tendency to have negative affect and general indecisiveness, choice/commitment anxiety describes resistance/hesitance to

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committing to one choice, lack of readiness describes barrier to engaging in the process of career decision making, and interpersonal conflicts describes impasse due to disagreement with and discouragement by other people. This comprehensive model has stood the subsequent empirical examinations cross-culturally (Abrams, Lee, Brown, & Carr, 2014; Abrams et al., 2013; Carr et al., 2014; Hacker, Carr, Abrams, & Brown, 2013).

Career Indecision Measurement

Corresponding to the different career indecision models, there have been four generations of career indecision measurement marked by four important indecision measures ranging from the Career Decision Scale (Osipow, 1987), the Career Factors Inventory (Chartrand et al., 1990), the Career Decision Difficulties Questionnaire (Gati et al., 1996), to the latest Career Indecision Profile (Brown et al., 2012) (Brown & Rector, 2008; Osipow, 1999).

The Career Decision Scale (CDS) (Osipow, 1987) represents the first generation of indecision measurement (Osipow, 1999). It was originally developed by Osipow and his colleagues as a diagnostic tool for determining differential treatments (Osipow, 1999). All the items are derived from their clinical experience, serving to identify client indecision problems. Therefore, the CDS is not a theoretically developed measure. While it has been popularly applied as a research instrument and it is particularly effective in reflecting treatment changes (Kelly & Lee, 2002), the structure/dimensionality of this scale is hotly debated (Osipow, 1999). Facing the inconsistent and unstable factor structure and loadings, Osipow (1994) suggested that it is best to use the CDS as a single-factor model of career indecision. Therefore, the CDS does not work as a representation of a multidimensional model of career

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indecision. Instead, it serves as a screening check-list of client indecision problems and the total score is recommend as an indicator of career indecision and intervention effectiveness.

The Career Factors Inventory (CFI) (Chartrand et al., 1990) represents the second generation of indecision measurement (Osipow, 1999). The CFI was rationally developed based on the belief that there are two broad domains of career indecision, which are lack of information and affective/personality related impediments. Chartrand and his colleagues (1990) conducted an exploratory and confirmatory factor analysis and revealed four stable factors, consisting of Need for Career Information and Need for Self-Knowledge under the informational deficit domain and Career Choice Anxiety and General Indecisiveness under the affective impediment domain. While both the CFI and the CDS are designed as a diagnostic tool, the CFI has advantage over the CDS as it is based on a multidimensional model and could reliably capture multiple domains of career indecision. There has been evidence showing the differential association pattern of the CFI subscales with criteria such as anxiety, self-esteem, goal instability, and vocational identity (Chartrand et al., 1990).

The Career Decision Difficulties Questionnaire (Gati et al., 1996) is a third-generation approach of measuring indecision based on a taxonomy model of career indecision (Osipow, 1999). Gati, Krausz, and Osipow's multidimensional model of career indecision (1996) was developed based on an adaptation of decision making theory to the context of career decisions. It proposed three overarching domains of career indecision, consisting of lack of readiness, lack of information, and inconsistent information. Lack of readiness describes career indecision due to the three indicators of lack of motivation, traits-like indecisiveness, and dysfunctional beliefs. Lack of information describes career indecision due to the four indicators of

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lack of information about the career decision making process, about self, about occupations, and about ways of obtaining additional information. Inconsistent information describes career indecision due to the three indicators of unreliable information, internal conflicts, and external conflicts.

There has been a good deal of data supporting the reliability and validity of this model among college students (e.g., Gati et al., 1996; Gati & Saka, 2001; Osipow & Gati, 1998). However, the previous research has also indicated that the three indicators of the lack of readiness domain diverged from each other as demonstrated in low correlations among the indicators and low alpha coefficients compared to the other two domains (e.g., Gati et al., 1996; Gati & Saka, 2001; Osipow & Gati, 1998). This suggests that lack of readiness is not a sound factor. Instead, lack of readiness should be treated more as three distinct indecision types. While the CDDQ provides a more systematic and comprehensive measurement of multiple domains of career indecision, it still does not capture the entire range of career indecision, excluding factors such as anxiety and identity (Kelly & Lee, 2002).

The Career Indecision Profile (Brown et al., 2012) represents the latest evolvement of career indecision measurement. It is constructed based on Brown and Rector (2008)'s four-factor model of career indecision, consisting of neuroticism/negative affectivity (NN), choice/commitment anxiety (CC), lack of readiness (LR), and interpersonal conflicts (IC). The conspicuous advantage of this model over the previous models is its comprehensive, if not complete, coverage of indecision domains through synthesizing extant indecision-related variables. Those four factors are general enough to cover broad issues postulated in different theory-driven models. For example, neuroticism/negative affectivity resonates with general indecisiveness in the CDDQ (Gati et al., 1996) and anxiety in the EPCD (Saka

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et al., 2008). Choice/commitment anxiety resonates with lack of information in the CDDQ (Gati et al., 1996) and career choice anxiety in the CFI (Chartrand et al., 1990). Lack of readiness resonates with lack of motivation in the CDDQ (Gati et al., 1996) and low self-efficacy in the SCCT (Lent & Brown, 2013). Interpersonal conflicts could resonate with external inconsistency in the CDDQ (Gati et al., 1996). Addressing the common limitation of the previous indecision measures that they do not represent the entire indecision domain, the CIP is thus endorsed as a better instrument for career indecision, especially when the research is focused on comprehensively measuring domains of career indecision.

The CIP has a full version of CIP-167 (Brown et al., 2012) and a short version of CIP-65 (Hacker et al., 2013). The short version of CIP-65 would be employed in the current study given its parsimony , adequate domain coverage, and satisfactory reliability and validity consistently revealed in several studies (Abrams et al., 2014; Abrams et al., 2013; Carr et al., 2014; Hacker et al., 2013). There is one thing noteworthy when using the CIP model. While the CIP-65 exhibits a better domain sampling and appears to be a stronger research instrument, it could fall short in specificity which is a key for a diagnostic tool. While the four general factors describe four broad problems resulting in career indecision, they do not sufficiently indicate what factors lead to the problems. Therefore, it would be difficult to rely on the four general factors to determine differentiated interventions. However, linking the CIP-65 to a nomological network of important career development variables could potentially provide a more promising approach of investigating career indecision with both breadth (through the comprehensive indecision measurement) and depth (through specific important career variables). This is the focus of the current study.

Career Indecision Intervention

While the career indecision research serves to improve our understandings of why people get stuck in the career decision-making process, it is also expected to inform the career intervention. It has been envisioned for many decades that career counselors would be able to identify the problem based on an empirically validated taxonomy model of indecision and then work with client on the problem (Brown & Rector, 2008; Kelly & Lee, 2002). However, Kelly and Lee (2002) expressed their disappointment that our field is not close to the ideal status of differential diagnoses leading to differential treatments. However, their perspective is heavily biased by the medical model, which emphasizes the diagnosis-specific treatment ingredients. Certainly, the empirically supported treatments have been proven to be effective, but the therapeutic effects of the specialized treatments relative to the common/contextual factors have not received promising support and the causal attribution is debatable (Wampold, 2001). With that in mind, the career intervention research could be considered to be progressing and has demonstrated effectiveness of intervention on several key career decision related constructs.

In general, the research has been positive regarding the effectiveness of career intervention on career decision making. Masdonati, Massoudi, and Rossier (2009b) found that career counseling could reduce career indecision on two aspects of lack of information and inconsistent information, but not on lack of readiness. Reese and Miller (2009) found that after a career development course, students improved their career decision-making self-efficacy and this improvement was maintained in the second year. Gati et al. (2013) found that young veterans benefited from a career workshop on domains of career indecision (Gati et al., 1996), except general

indecisiveness, dysfunctional beliefs, and internal conflicts. Perdrix, Stauffer, Masdonati, Massoudi, and Rossier (2012) investigated the long-term effectiveness of career counseling and found a continual decrease of career indecision and stabilization with respect to clients' satisfaction with life in an one-year follow up. Fouad, Cotter, and Kantamneni (2009) revealed that students upon completion of a college career course reduced their career decision-making difficulties and increased their career self-efficacy. Their perceptions of barriers however did not change. While the general efficacy of career intervention is supported, there has been research exploring the differential effects of intervention approaches. For example, Whiston, Brecheisten, and Stephens (2003) meta-analytically examined the effectiveness of different career intervention modalities. They found that interventions that did not involve a counselor were generally less effective than other modalities. They also found that workshops or structured groups tended to produce better outcomes than non-structured career counseling groups.

   Brown and Krane (2000) argued for treatment ingredients being more important than treatment modalities. They meta-analytically found five critical ingredients for successful career intervention and several other ingredients (Brown & Krane, 2000). Those five critical ingredients are workbooks and written exercises, individualized interpretations and feedback, world of work information, modeling, and attention to building support. The unique effectiveness of the five critical ingredients were demonstrated by more critical ingredients being associated with more intervention effect sizes (Brown & Krane, 2000). The finding of the number of other components being disassociated with intervention effect sizes corroborated this claim further (Brown et al., 2003). However, the revealed pattern does not necessarily mean Brown and Krane (2000)'s five critical ingredients are more important than other ingredients;

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alternatively, it could indicate that those five ingredients have unique effects that cannot be provided by other ingredients and they are highly desired in the population being investigated.

While Brown and Krane (2000)'s five critical ingredients emphasizes the content of career intervention (i.e., what should be done), Heppner and Heppner (2003) emphasized the process of career intervention (i.e., how the context/process should be). This distinction resonates with the great debate in psychotherapy between the medical model and the context model (Wampold, 2001). While a medical model is centered on differential treatment components driven by differential diagnoses, a context model values more how an intervention is performed. In the context of career intervention, Masdonati, Massoudi, and Rossier (2009a) have examined an important process variable of the working alliance. They found that the working alliance was positively associated with clients' satisfaction with the intervention and with the final level of their life satisfaction. The working alliance was also found to be negatively associated with the career indecision levels.

Regardless of the focus of career intervention approaches, facilitating career exploration is commonly a key objective. Career exploration is conceived as a process of collecting information about the self and about the world of work. It has been widely conceived as a critical area for career decision making, or more broadly individual career development (Blustein, 1997; Super, 1994). Super (1994) proposed career exploration being an important developmental stage in his life-span and life-space model, in which individuals collect information and begin to form their vocational identity. Without collecting adequate information, individuals are likely to have unclear career goals, little knowledge about possible alternative choices, poor motivation to make a career decision, or confusion about who they are (Fouad et al.,

2009). Therefore, career exploration has been proposed as an important target for career intervention for many decades. Parsons (1909) long ago proposed his three-step model of career guidance, in which individuals collect information about the self and the vocational world and then use results of these two steps to identify a matching educational or vocational choice. This approach have resonated in many subsequent career theories (e.g., Holland, 1997; Parsons, 1909; Sampson et al., 1999), the commonality of which is the emphasis on information based decision making.

With this same underlying theoretical stance, those theories depicting correspondence between person and environment emphasize different aspects of information. The theory of work adjustment (Dawis & Lofquist, 1984) proposes value to be an important area of information regarding the self and the vocational environment. It claims that a good match based on the values of individuals and the employer is the key for satisfaction of both sides, which leads to good performance and tenure. In contrast, Holland (1997)'s theory emphasizes the information of career interest and the match of individual interest with career characteristics. Holland (1997) proposed a hexagon structure organizing six interest types (i.e., realistic, investigate, artistic, social, enterprise, and conventional; RIASEC), which is the commensurate structure for both individual interest and career characteristics. Thereby, individuals can easily find an area of match based on the interest profile and the career profile. Holland (1997)'s model has enormous impact on the field, as it not only articulates the dimensionality of interest types but also nicely organize them on an elegant spatial structure for both individuals and careers. The research has also shown that the consistency and differentiation of those six interest types predict career certainty and occupational stability (Tracey, Wille, Durr II, & De Fruyt, 2014), which speaks to an important argument that the quality of information matters.

Clearly the efficacy of information-oriented models in career intervention is dependent on the quality of information individuals can access. However, individuals commonly do not have unequivocal information or the information needed is simply unavailable at the decision moment. Xu, Hou, and Tracey (2014) have demonstrated that the associations of self-exploration and environmental exploration with different domains of career indecision were at most moderate, which is smaller than the effect size expected by the theory. While career exploration is still important for career development, an intervention beyond the scope of information gathering is thus additionally needed, as argued by Krieshok, Black, and McKay (2009). Especially in the more dynamic modern society where information is commonly complex and changing, the adaptability of individuals rather than the stability of a vocational choice is much more emphasized (Savickas & Porfeli, 2012). The key capacity as argued by Savickas and Porfeli (2012) is to "solve the unfamiliar, complex, and ill-defined problems presented by developmental vocational tasks, occupational transitions, and work traumas" (pp. 662). How to handle informational ambiguity characterized by novelty, complexity, and inconsistency is thus a key for successful career decision making.

Theory of Ambiguity Tolerance

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). Viewed as a personality variable (Budner, 1962; Frenkel-Brunswik, 1949), the construct of ambiguity intolerance has been conceived to describe individual tendency to interpret an ambiguous situation as a threat or a source of discomfort, while

ambiguity tolerance has been conceived to describe individual tendency to perceive ambiguous situations desirable (Budner, 1962; Frenkel-Brunswik, 1949). Furnham and Ribchester (1995) postulated manifestations of ambiguity tolerance that 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.

While the construct of ambiguity tolerance is derived from Frenkel-Brunswik's early work depicting characteristics of AT (1949), it is Budner (1962) who first systematically operationalized both "ambiguity" and "tolerance" and thus further clarified the construct of AT. In general, Budner (1962) defined an ambiguous situation as one which individuals cannot adequately structure or categorize (Budner, 1962). He proposed three important ambiguous situations characterized by novelty, complexity, and insolubility/inconsistency respectively. Among them, novelty refers to a completely new situation in which there is no familiar information. Complexity refers to a situation in which there is a great number of information to be taken into account simultaneously. Insolubility/inconsistency refers to a contradictory situation in which different elements or information suggests different structures. Therefore, Budner (1962)'s model of ambiguity is a tripartite model, consisting of three elements of novelty, complexity, and insolubility/inconsistency.

Budner (1962) also proposed four responses when identifying tendency to perceive ambiguous situations as sources of threat. He categorized them into two overarching domains, consisting of the phenomenological domain (i.e., cognitive and emotional) and the operative domain (i.e., behavioral). Each domain has two categories, consisting of denial and submission. While submission portrays the

recognition of the situation as an ineluctable existence which an individual cannot change, denial portrays the performance by which the objective reality or the subjective reality of an individual is altered to accommodate the avoidance desires. So this 2 by 2 model of tolerance generates a hierarchical model describing four responses of phenomenological denial (e.g., distortion and denial), phenomenological submission (e.g., anxiety and discomfort), operative denial (e.g., destructive behavior), and operative submission (e.g., avoidance behavior). Budner (1962) thus argued that if an individual exhibits any one of those four types of responses, it seems plausible to infer that this person is threatened by ambiguity.

As can be seen, Budner (1962)'s elaboration of his model emphasizes the idea of "*ambiguity as threat*", which is focused on the negative part of the AT construct. When investigating the whole range of ambiguity tolerance, there are three distinct reactions which have been suggested to indicate different levels of ambiguity tolerance, consisting of cognitive reactions, emotional reactions, and behavioral reactions (Bhushan & Amal, 1986; Grenier, Barrette, & Ladouceur, 2005). On the cognitive aspect, people with low levels of ambiguity tolerance tend to perceive an ambiguous situation to be rigidly in black or white, while people with high levels of ambiguity tolerance tend to exhibit more cognitive flexibility (Martin & Rubin, 1995). On the emotional aspect, people with low levels of ambiguity tolerance tend to express uneasiness, discomfort, and anxiety in response to an ambiguous situation, while people with high levels of ambiguity tolerance tend to feel curious, interested, and even excited for an ambiguous situation. On the behavioral aspect, people with low levels of ambiguity tolerance are more likely to reject or avoid an ambiguous situation, while people with high levels of ambiguity tolerance are more likely to approach and persist in an ambiguous situation.

Over the past 60 years, the construct of ambiguity tolerance has drawn interests from several areas of psychology investigating its association with different variables. In organizational psychology, ambiguity tolerance has been supported as an important role in entrepreneur inclination and performance (Morris, Webb, Fu, & Singhal, 2013; Ng, 2013), given the fact that a core task for entrepreneurs is to make decisions under ambiguity. For example, Koh (1996) found a strong positive association of ambiguity tolerance with an individual's entrepreneurial inclination. Begley and Boyd (1988) also found evidence for the hypothesis that established entrepreneurs had a higher level of ambiguity tolerance than the small business managers given more ambiguity in entrepreneurs' decision making. Holding the same theoretical stance, Wagener, Gorgievski, and Rijsdijk (2010) and Schere (1982) revealed that ambiguity tolerance is a characteristic distinguishing entrepreneurs from managers. Endres, Chowdhury, and Milner (2009) examined the link of ambiguity tolerance with self-efficacy in a complex decision task. Their positive results again suggested that ambiguity tolerance plays a critical role in ambiguous decision-making situations.

In clinical psychology, Dugas and his colleagues (Buhr & Dugas, 2002; Buhr & Dugas, 2006; Dugas, Gagnon, Ladouceur, & Freeston, 1998; Dugas, Gosselin, & Ladouceur, 2001) place ambiguity tolerance on an important spot in their theoretical model of anxiety symptoms. They argued that people intolerant of ambiguity tend to exhibit excessive worry about future, as the future is full of ambiguous informational clues (Dugas et al., 1998). Dugas, Gagnon, Ladouceur, and Freeston (1998) found support for ambiguity intolerance being pivotal in distinguishing Generalized Anxiety Disorder patients from non-clinical subjects. Even in non-clinical samples, the research has been able to demonstrate that ambiguity intolerant people are more likely to have worry, obsessions/compulsions, and panic sensations (Buhr & Dugas, 2006;

Dugas et al., 2001). Based on the consistent empirical evidence, Buhr and Dugas (2006) proposed that ambiguity tolerance is a fundamental construct involved in excessive worry.

In cognitive psychology, ambiguity tolerance has been linked a variety of cognitive styles concerning about flexibility, complexity, or curiosity. McLain (1993) found that ambiguity tolerant people tend to exhibit less dogmatism and more receptivity to change, as they are more open to alternative and innovative solutions. Rotter and O'Connell (1982) argued that people with high levels of ambiguity tolerance are likely to exhibit more cognitive complexity as they are more comfortable and competent with abstractness. This claim was supported in the finding of a negative association of cognitive complexity with ambiguity intolerance. Litman (2010) proposed a two-factor model of curiosity, consisting of I-type and D-type. While I-type curiosity involves obtaining information to stimulate positive feelings of interest, D-type curiosity is motivated by reducing undesirable states of informational paucity. It has been shown that ambiguity tolerance is positively associated with I-type curiosity and negatively associated with D-type curiosity, as ambiguity tolerant people tend to find new information interesting and have less desire to obtain information in order to feel comfortable (Litman, 2010). Silver (1996) also found that people with higher levels of ambiguity tolerance tend to have less rigid thinking. All these studies thus portray ambiguity tolerant people as being flexible, open-minded, and curious in information processing.

Ambiguity Tolerance in Career Decision Making

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, inconsistent, or unpredictable information (Gati et al., 1996). There has been empirical evidence supporting the positive link of ambiguity tolerance with career decision making. Xu and Tracey (2014) 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 (2015a) have also demonstrated that ambiguity tolerance was positively linked to career decision-making self-efficacy. While the previous studies support the idea that ambiguity tolerance is an important factor and merits clinical attention in career intervention, these investigations are based on the construct and the measurement of general ambiguity tolerance, which does not necessarily capture the unique aspects of ambiguity tolerance in career decision making.

Therefore, Xu and Tracey (2015b) constructed a scale to measure the domain-specific 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 has been 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.

Drawing on Budner's (1962) tripartite model, Xu and Tracey (2015b) proposed four important ambiguous situations in career decision making in their model of career decision ambiguity tolerance, comprising novelty, complexity, inconsistency,

and unpredictability. Novelty in career decision making refers to situations in the career decision making process in which information encountered is new to decision makers (Budner, 1962). Complexity 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). Inconsistency 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). In addition to these three sources of 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.

All these four ambiguous situations are considered to be prevailing in career decision making. It is likely that individuals could encounter new information about either the self or the world of work in their career exploration process (Parsons, 1909; Super, 1994) that they rarely realized or heard before. They might also need to learn new decision making skills or apply learned skills to new life situations. As multiple aspects of information have been proposed by vocational psychology to be considered in career decision making (Dawis & Lofquist, 1984; Sampson et al., 1999), it is challenging for individuals to make sense of the complex process and integrate information. Also different aspects of information in the career decision-making process commonly contradict each other, reflecting the complexity and diversity of human life. Individuals are likely to find that other people's evaluations of the potential career choice differ or the meaning of the information varies depending on the criteria or perspective. Germeijs and De Boeck (2003) posited the role of uncertainty about the outcome in career indecision. Unfortunately, the information

about the future is commonly unavailable at the decision making moment and the future is yet to be created, which is described as fundamental uncertainty by Dequech (2000).

While Xu and Tracey (2015b) anticipated a four-factor structure of career decision ambiguity tolerance, the final version of the Career Decision Ambiguity Tolerance Scale (CDAT) showed a three-factor structure of the CDAT, consisting of preference, tolerance, and aversion. Preference describes individual tendency to feel interested and excited for ambiguity in career decision making. Tolerance describes individual tendency to feel acceptance for ambiguity and competent in coping with ambiguity in career decision making. Aversion describes individual tendency to avoid and withdraw from ambiguity in career decision making. The low inter-factor correlations also indicated that these three factors of the CDAT are relatively independent of each other with each capturing some unique aspect of the construct. More promisingly, the CDAT was found to additively predict all dimensions of career indecision as measured by the Career Decision-making Difficulty Questionnaire (Gati et al., 1996), career decision-making self-efficacy, and career adaptability (Savickas & Porfeli, 2012) over and beyond general ambiguity tolerance. Thus, the evidence is consistent and strong at supporting the association of career decision ambiguity tolerance with many important criteria of career decision making, suggesting that career decision ambiguity tolerance merits more research attention and clinical application. While the importance of handling ambiguity in career decision making has been well validated in a cross-sectional manner, it would be important to explore the longitudinal impact of career decision ambiguity tolerance on career decision making. This information is especially critical for interventions that are focused on improving people's career decision ambiguity tolerance.

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In examining the longitudinal impact of career decision ambiguity tolerance, a critical research question is how career decision ambiguity tolerance leads to the subsequent change of career indecision. A finding of career decision ambiguity tolerance leading to the subsequent alleviation of career indecision would further substantiate the clinical utility of career decision ambiguity tolerance.

Among the three factors of career decision ambiguity tolerance (i.e., preference, tolerance, and aversion), it could be expected that people with high levels of preference are more likely to engage in the career decision-making process, as they tend to find new information in this process interesting and exciting. Therefore, it is hypothesized that preference positively predicts the subsequent alleviation of lack of readiness. However, the preference factor is not expected to predict the subsequent change of neuroticism/negative affectivity and interpersonal conflicts, as the negative affectivity and interpersonal conflicts have nothing to do with people's liking and approaching towards new information. The factor of preference is not expected to predict choice/commitment anxiety either, as people with a higher level of preference do not necessarily feel comfortable with committing to a single choice, although they are likely to find exploring career options interesting.

As the tolerance factor emphasizes individual acceptance and confidence with ambiguity in career decision making, it is expected that this factor could negatively predict the subsequent changes of neuroticism/negative affectivity, choice/commitment anxiety, lack of readiness, and interpersonal conflicts. People who feel more comfortable and confident in handling ambiguity in their career decision-making process would experience less anxiety in the decision-making

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process. They also tend to exhibit a better motivation for career decision-making and show less difficulty with endorsing a single career choice and dealing with interpersonal conflicts.

The aversion factor of career decision ambiguity tolerance should be positively predictive of the subsequent changes of neuroticism/negative affectivity, choice/commitment anxiety, lack of readiness, and interpersonal conflicts. People with a higher level of ambiguity aversion are expected to show a higher level of anxiety in career decision making and find it more difficult to engage in the career decision-making process, commit to a single career choice, and deal with interpersonal conflicts. On contrary, people with a lower level of ambiguity aversion would be anticipated to exhibit alleviation in those indecision areas over time.

Career Indecision Predicting Ambiguity Tolerance

However, career indecision would also predict the subsequent career decision ambiguity tolerance over time and this longitudinal prediction cannot be examined in the previous concurrent research. The key mechanism of career indecision leading to subsequent career decision ambiguity tolerance rests on the elevated experience of anxiety trigged by career indecision. When individuals encounter career indecision, they commonly experience anxiety, as decidedness is widely endorsed as the social norm for adults (Krumboltz, 1992). The past research has consistently found the association of anxiety with career indecision (i.e., Campagna & Curtis, 2007; Fuqua et al., 1988; Fuqua et al., 1987; Krumboltz, 1992) that anxiety is associated with an increased career indecision and a reduced career certainty. Therefore, in general individuals with more indecision would bear more anxiety and consequently they

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would exhibit more negative evaluation regarding ambiguity in career decision making and react more anxiously.

Using the framework of CIP-65 specifically, I anticipated that neuroticism/negative affectivity, choice/commitment anxiety, lack of readiness, and interpersonal conflicts would negatively predict tolerance and positively predict aversion. Negative feelings, difficulty in committing, barrier in initiating decision-making, and disagreement with other people are likely to reduce people's confidence and acceptance and elevate their anxiety and avoidance regarding ambiguity over time. Lack of readiness is additionally anticipated to negatively predict preference, as difficulty in initiating decision-making would prevent individuals from searching for new information.

While the concurrent association of career decision ambiguity tolerance with career indecision has been clearly demonstrated in the previous cross-sectional research (Xu, Hou, Tracey, & Zhang, 2016; Xu & Tracey, 2014, 2015a; Xu & Tracey, 2015b), the dynamic link of career indecision leading to the subsequent career decision ambiguity tolerance has not been adequately assessed. This piece of information is important for a holistic understanding of the dynamic interplay of career decision ambiguity tolerance and career indecision over time. Therefore, I proposed and examined a reciprocal model of career decision ambiguity tolerance and career indecision leading to each other over time and hypothesized that this model will be better than the unidirectional model of career decision ambiguity tolerance predicting subsequent career indecision.

Summary

While the previous research has demonstrated the importance of handling ambiguity in career decision making (Xu et al., 2014; Xu & Tracey, 2014, 2015a; Xu & Tracey, 2015b), the current study is intended to extend this research line by examining the dynamic interplay of career decision ambiguity tolerance and career indecision leading to each other over time in a longitudinal manner. A longitudinal examination is especially valuable in terms of providing information about the within-person change over time across constructs of career decision ambiguity tolerance and career indecision. While a cross-sectional correlation preliminarily depicts the association of these two constructs, a longitudinal change model reveals more about the dynamic impact between them over time, which constitutes the empirical foundation for career intervention.

The longitudinal examination of career decision ambiguity tolerance and career indecision would be based on Brown and his colleagues (2012)'s four-factor model of career indecision and Xu and his colleagues (2015b)'s three-factor model of career decision ambiguity tolerance. Brown and his colleagues (2012)'s four-factor model of career indecision comprises of neuroticism/negative affectivity, choice/commitment anxiety, lack of readiness, and interpersonal conflicts. This meta-analytically derived model has the merit of capturing the comprehensive range of indecision domains. Xu and his colleagues (2015b)'s three-factor model of career decision ambiguity tolerance embraces preference, tolerance, and aversion. This empirically validated model provides the state-of-art theory and measurement of career decision ambiguity tolerance.

I hypothesized that changes in the three aspects of career decision ambiguity tolerance (i.e., preference, tolerance, and aversion) and changes in the four domains of career indecision (i.e., neuroticism/negative affectivity, choice/commitment anxiety, lack of readiness, and interpersonal conflicts) would be predictive of each other over time. The reciprocal model is summarized and depicted by Figure 1.
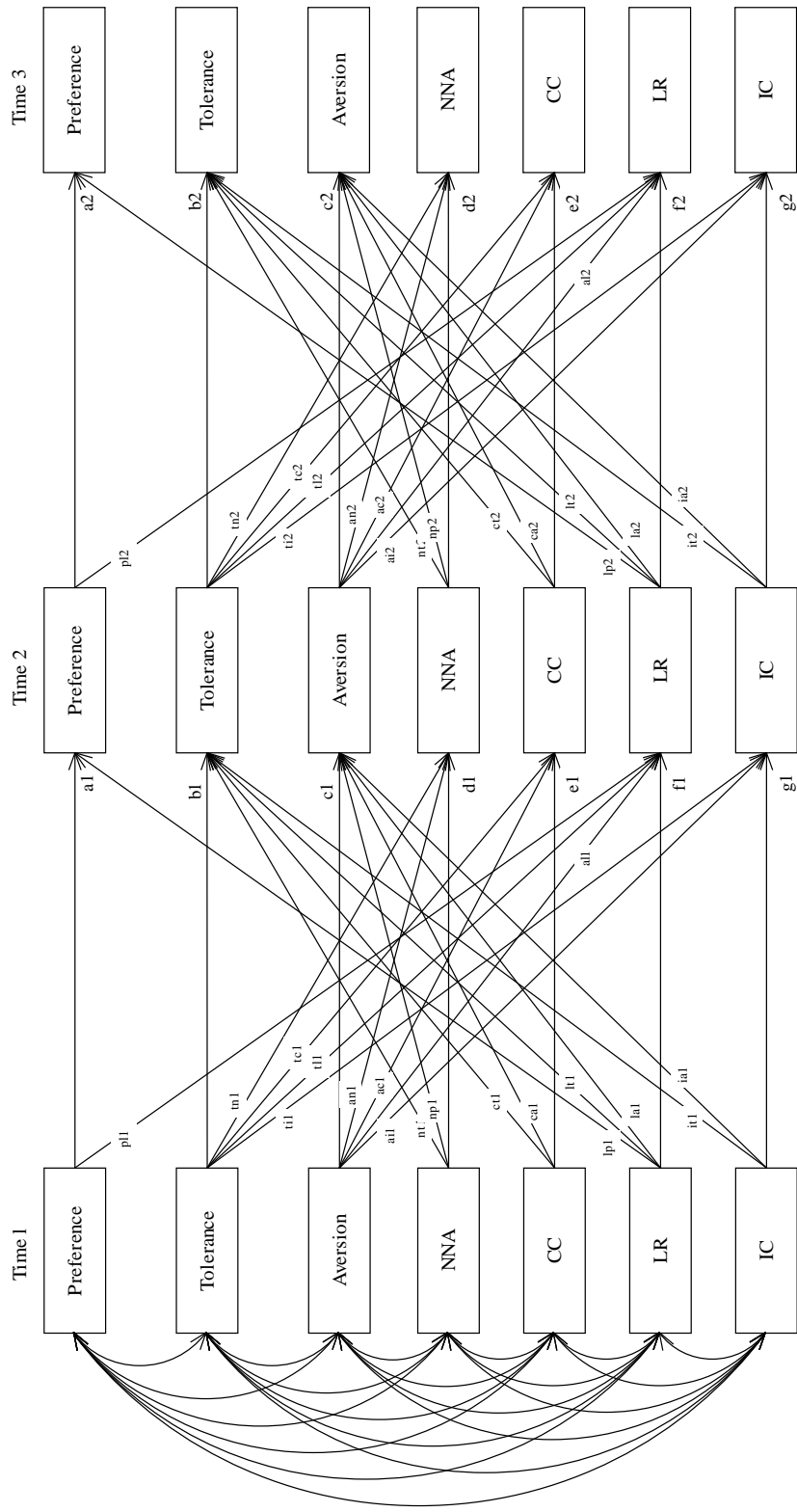
Figure 1. The Hypothesized Reciprocal Longitudinal Structural Model.
Preference = Career Decision Ambiguity Tolerance-Preference; Tolerance = Career Decision Ambiguity Tolerance-Tolerance;
Aversion = Career Decision Ambiguity Tolerance-Aversion; CC = CIP65-Choice/Commitment Anxiety; LR = CIP65-Lack of
Readiness; NNA = CIP65-Neuroticism/Negative Affectivity; IC = CIP65-Interpersonal Conflicts.

Specifically, I had a series of specific hypotheses concerning the link of career decision ambiguity tolerance to career indecision.

Hypothesis 1: Preference will be negatively predictive of subsequent lack of readiness (see paths pl1 and pl2).

Hypothesis 2: Tolerance will be negatively predictive of subsequent neuroticism/negative affectivity (see paths tn1 and tn2), choice/commitment anxiety (see paths tc1 and tc2), lack of readiness (see paths tl1 and tl2), and interpersonal conflicts (see paths ti1 and ti2).

Hypothesis 3: Aversion will be positively predictive of subsequent neuroticism/negative affectivity (see paths an1 and an2), choice/commitment anxiety (see paths ac1 and ac2), lack of readiness (see paths al1 and al2), and interpersonal conflicts (see paths ai1 and ai2).

The reciprocal effects of career indecision on subsequent career decision ambiguity tolerance were specified in the following hypotheses.

Hypothesis 4: Neuroticism/negative affectivity will be negatively predictive of subsequent tolerance (see paths nt1 and nt2) and positively predictive of subsequent aversion (see paths na1 and na2).

Hypothesis 5: Choice/commitment anxiety will be negatively predictive of subsequent tolerance (see paths ct1 and ct2) and positively predictive of subsequent aversion (see paths ca1 and ca2).

Hypothesis 6: Lack of readiness will be negatively predictive of subsequent preference (see paths lp1 and lp2) and tolerance (see paths lt1 and lt2), and positively predictive of subsequent aversion (see paths la1 and la2).

Hypothesis 7: Interpersonal conflicts will be negatively predictive of subsequent tolerance (see paths it1 and it2) and positively predictive of subsequent aversion (see paths ia1 and ia2).

3 METHODOLOGY

Sample

The current study tracked 583 undergraduate students recruited from a southwest state university for three waves. They ranged in age from 17 to 47 ($M = 19.26$, $SD = 2.91$). Of the sample, 33.4% were male (n=195), 65.7% were female (n=383), and .2% were self-identified as transgender (n=1). In terms of race/ethnicity, 7.9% (n=46) were African American/Black, 7.5% (n=44) were Asian/Asian American, 21.8% (n=127) were Latino (a)/Hispanic, 54.5% (n=318) were Caucasian/White, 1.9% (n=11) were Native American, 3.8% (n=22) were Multiracial, 1.9% (n=11) were self-identified as others.

Instruments

The Career Decision Ambiguity Tolerance Scale (CDAT). The 18-item CDAT (Xu & Tracey, 2015b) was developed to measure people's evaluations of and responses to unfamiliar, complex, inconsistent, and unpredictable information in career decision making. It contains three subscales of preference (6 items), tolerance (6 items), and aversion (6 items). Preference measures individual tendency to feel interested and excited for ambiguity in career decision making (e.g., "I am interested in exploring the many aspects of my personality and interests"). Tolerance measures individual tendency to experience acceptance of ambiguity and feel competent in coping with ambiguity in career decision making (e.g., "I enjoy tackling complex career decision making tasks"). Aversion measures individual tendency to avoid and withdraw from ambiguity in career decision making (e.g., "I try to avoid complicated career decision making tasks"). Participants would be invited to rate each item on a

7-point Likert scale ranging from 1 (strongly disagree) to 7 (strongly agree). After reverse coding for reverse items, high scores indicated high levels of tolerance with ambiguity in career decision making. Xu and Tracey (2015b) found consistent support for the three-factor structure of career decision ambiguity tolerance (i.e., preference, tolerance, and aversion), indicating that these three subscales capture unique information and should be used separately. Xu and Tracey reported alpha coefficients of .83, .70, and .81 for the three subscales of preference, tolerance, and aversion respectively (2015b). They also found evidence supporting the incremental validity of CDAT, as can be seen in its additive predictions on career decision-making self-efficacy, career indecision, and career adaptability over and beyond general ambiguity tolerance (Xu & Tracey, 2015b). The current study revealed alpha coefficients of .74-.87 for the three subscales (i.e., preference, tolerance, and aversion) across three time spots.

The Career Indecision Profile-65 (CIP-65). The CIP-65 (Hacker et al., 2013) is a 65-item self-report measure of career indecision based on the four-factor model (Brown et al., 2012), consisting of Neuroticism/Negative Affectivity (21 items), Choice/Commitment Anxiety (24 items), Lack of Readiness/Immaturity (15 items), and Interpersonal Conflict (5 items). Neuroticism/Negative Affectivity is intended to measure negative affect and general indecisiveness (e.g., "I focus on what will go wrong in deciding" and "I often feel fearful and anxious"). Choice/commitment anxiety (CC) is intended to measure resistance/hesitance to committing to one career choice largely resulted from multiplicity of career options or unavailability of information (e.g., "I am uncomfortable committing myself to a specific career" and "I need to learn more about myself before I can make a good career decision"). Lack of readiness (LR) is intended to measure barrier to engaging in the process of career

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decision making resulted from lack of planning, goal-directedness, or decision-making self-efficacy (e.g., "I am quite confident that I will be able to find a career in which I'll perform well" and "I plan ahead when I have to make an important decision"). Interpersonal Conflict is intended to measure interpersonal conflict individuals experience in career decision making (e.g., "Important people disagree with plans" and "Important people discourage plans"). Items would be rated on a 6-point Likert scale ranging from 1 (completely disagree) to 7 (strongly agree). After reverse coding for reverse items, a higher score on the four subscales indicates higher career indecision on the corresponding area. Hacker et al. (2013) reported the alpha coefficients of .93, .97, .88, and .89 for the four subscales respectively. The validity of the CIP-65 was supported in the findings of differential scores on the subscales between students enrolled in career planning courses and other courses and a significant association of the subscales with self-reported levels of decidedness (Hacker et al., 2013). The current study revealed alpha coefficients of .74-.87 for the four subscales of CIP-65 across three time spots.

Procedures

College students attending career development, university orientation, or introduction to psychology classes were invited to participate in this study as an extra credit opportunity. However, students were not individually contacted. Instead, instructors announced this research to all the students in their classes. Roughly, 1500 students received the announcement regarding this research. Students consenting to this research filled a demographic questionnaire and the package of research instruments online in the middle and at the end of a fall semester and filled out the same measures in the middle of the subsequent spring semester. Participating students

were asked about their email address on the first online survey and this information was used to follow up with them. Among the 583 students enrolled in the first wave of data collection, 282 participated in the second wave of data collection, and 121 participated in the third wave of data collection. Students were also asked about the first digits of their date of birth and the first characters of their names on the first survey. This information was used to create a unique ID for each participant so responses from different waves could be matched. No identifying information was solicited on online surveys. All the individual responses were kept as anonymous and confidential through analysis.

Analysis

I examined the proposed reciprocal relations based on a three-wave cross-lagged panel model (see Figure 1) (Little, Preacher, Selig, & Card, 2007). The constructs of preference, tolerance, aversion, neuroticism/negative affectivity, choice/commitment anxiety, lack of readiness, and interpersonal conflicts were assessed by the scale scores at each wave. The structural relational pattern was examined in the framework of Structural Equation Modeling by using Mplus7. I adopted a progressive analysis strategy to examine a series of competing models with increasing model specificities. This procedure involved a model with predictions from career decision ambiguity tolerance only, a reciprocal model with additional predictions from career indecision, and a model with constraints on predictions across waves.

The fit of the models would be evaluated using the criteria recommended by Hu and Bentler (1999): robust chi-square, CFI (> .90), RMSEA (< .08), and SRMR (<.08). With the purpose of making the statistical tests robust to non-normality, I adopted the robust maximum likelihood parameter estimation. A nested model

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comparison approach was used to precisely examine which model represents the data better. Differences between nested models would be compared using the Santorra-Bentler scaled chi-square difference test (Muthén & Muthén, 2012).

Following Schlomer, Bauman, and Card's (2010) suggestion, we conducted the Little (1988)'s test to investigate the missing pattern. The result indicated that the current data were not Missing Completely at Random (MCAR), $\chi 2$ (105, N=583) = 134.58, $p < .05$. I then created dummy variables by coding missing values as "1" and non-missing values as "0" for each analysis variable. Table 1 shows the bivariate correlations of these dummy variables with analysis variables. As can been seen, there are small to moderate predictions at most from analysis variables on dummy variables, indicating that Missing at Random (MAR) could be a plausible assumption. Given the fact that analysis variables correlated with each other across different waves, there is a possibility that dummy variables could be predicted by the missing values of the corresponding analysis variables (i.e., Not Missing at Random, NMAR). However, such a NMAR pattern still would not be prominent due to the weak associations found in the MAR analysis (Graham, 2009). Schlomer et al. (2010) showed that the Full Information Maximum Likelihood estimation (FIML), which estimates model parameters based on all available information, is appropriate under the condition of MAR. Thus, I used FIML to handle the missing data of the longitudinal career decision ambiguity tolerance and career indecision in the analysis.

Table 1. *Predictions of Analysis Variables on Dummy Variables*

	NNA1	CC1	LR1	IC1	NNA2	CC2	LR2	IC2	NNA3	CC3	LR3	IC3
DNNA1	–	–	–	–	-.05	-.10	-.08	-.06	–	–	–	–
DCC1	–	–	–	–	-.05	-.10	-.08	-.06	–	–	–	–
DLR1	–	–	–	–	-.05	-.10	-.08	-.06	–	–	–	–
DIC1	–	–	–	–	-.05	-.10	-.08	-.06	–	–	–	–
DNNA2	-.04	.01	.11**	.03	–	–	–	–	.01	-.05	-.08	.03
DCC2	-.04	.01	.11**	.03	–	–	–	–	.01	-.05	-.08	.03
DLR2	-.04	.01	.11**	.03	–	–	–	–	.01	-.05	-.08	.03
DIC2	-.04	.01	.11**	.03	–	–	–	–	.01	-.05	-.08	.03
DNNA3	-.02	-.03	.06	.02	-.11	-.15*	.01	-.07	–	–	–	–
DCC3	-.02	-.03	.06	.02	-.11	-.15*	.01	-.07	–	–	–	–
DLR3	-.02	-.03	.06	.02	-.11	-.15*	.01	-.07	–	–	–	–
DIC3	-.02	-.03	.06	.02	-.11	-.15*	.01	-.07	–	–	–	–

$N = 583$. Preference = Career Decision Ambiguity Tolerance-Preference; Tolerance = Career Decision Ambiguity Tolerance-Tolerance; Aversion = Career Decision Ambiguity Tolerance-Aversion; CC = CIP65-Choice/Commitment Anxiety; LR = CIP65-Lack of Readiness; NNA = CIP65-Neuroticism/Negative Affectivity; IC = CIP65-Interpersonal Conflicts. Numbers indicate assessment time, e.g., NNA1 = Neuroticism/negative affectivity at wave 1. The prefix of "D" represents "dummy".

Table 1 (cont'd)

	CDATP1	CDATT1	CDATA1	CDATP2	CDATT2	CDATA2	CDATP3	CDATT3	CDATA3
DNNA1	.01	.06	.00	.05	-.01	-.07	.02	-.05	.02
DCC1	.01	.06	.00	.05	-.01	-.07	.02	-.05	.02
DLR1	.01	.06	.00	.05	-.01	-.07	.02	-.05	.02
DIC1	.01	.06	.00	.05	-.01	-.07	.02	-.05	.02
DNNA2	-.11**	.06	-.06	.00	.08	.00	-.03	.21*	-.07
DCC2	-.11**	.06	-.06	.00	.08	.00	-.03	.21*	-.07
DLR2	-.11**	.06	-.06	.00	.08	.00	-.03	.21*	-.07
DIC2	-.11**	.06	-.06	.00	.08	.00	-.03	.21*	-.07
DNNA3	-.12**	.01	-.09*	-.07	.10	-.19**	.20*	.07	-.18
DCC3	-.12**	.01	-.09*	-.07	.10	-.19**	.20*	.07	-.18
DLR3	-.12**	.01	-.09*	-.07	.10	-.19**	.20*	.07	-.18
DIC3	-.12**	.01	-.09*	-.07	.10	-.19**	.20*	.07	-.18

$N = 583$. Preference = Career Decision Ambiguity Tolerance-Preference; Tolerance = Career Decision Ambiguity Tolerance-Tolerance; Aversion = Career Decision Ambiguity Tolerance-Aversion; CC = CIP65-Choice/Commitment Anxiety; LR = CIP65-Lack of Readiness; NNA = CIP65-Neuroticism/Negative Affectivity; IC = CIP65-Interpersonal Conflicts. Numbers indicate assessment time, e.g., NNA1 = Neuroticism/negative affectivity at wave 1. The prefix of "D" represents "dummy".

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Table 1 *(cont'd)*

	NNA1	CC1	LR1	IC1	NNA2	CC2	LR2	IC2	NNA3	CC3	LR3	IC3
DCDATP1	–	–	–	–	-.05	-.10	-.08	-.06	–	–	–	–
DCDATT1	–	–	–	–	-.05	-.10	-.08	-.06	–	–	–	–
DCDATA1	–	–	–	–	-.05	-.10	-.08	-.06	–	–	–	–
DCDATP2	-.03	.01	.11**	.03	–	–	–	–	.03	-.04	-.07	.04
DCDATT2	-.03	.01	.11**	.03	–	–	–	–	.03	-.04	-.07	.04
DCDATA2	-.03	.01	.11**	.03	–	–	–	–	.03	-.04	-.07	.04
DCDATP3	.01	-.01	.08*	.04	-.04	-.11	.05	-.01	–	–	–	–
DCDATT3	.01	-.01	.08*	.04	-.04	-.11	.05	-.01	–	–	–	–
DCDATA3	.01	-.01	.08*	.04	-.04	-.11	.05	-.01	–	–	–	–

$N = 583$. Preference = Career Decision Ambiguity Tolerance-Preference; Tolerance = Career Decision Ambiguity Tolerance-Tolerance; Aversion = Career Decision Ambiguity Tolerance-Aversion; CC = CIP65-Choice/Commitment Anxiety; LR = CIP65-Lack of Readiness;

NNA = CIP65-Neuroticism/Negative Affectivity; IC = CIP65-Interpersonal Conflicts. Numbers indicate assessment time, e.g., NNA1 = Neuroticism/negative affectivity at wave 1. The prefix of "D" represents "dummy"

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Table 1 (cont'd)

	CDATP1	CDATT1	CDATA1	CDATP2	CDATT2	CDATA2	CDATP3	CDATT3	CDATA3
DCDATP1	–	–	–	.05	-.01	-.07	–	–	–
DCDATT1	–	–	–	.05	-.01	-.07	–	–	–
DCDATA1	–	–	–	.05	-.01	-.07	–	–	–
DCDATP2	-.10*	.05	-.06	–	–	–	-.03	.20*	-.06
DCDATT2	-.10*	.05	-.06	–	–	–	-.03	.20*	-.06
DCDATA2	-.10*	.05	-.06	–	–	–	-.03	.20*	-.06
DCDATP3	-.12**	.01	-.08	-.11	.08	-.12*	–	–	–
DCDATT3	-.12**	.01	-.08	-.11	.08	-.12*	–	–	–
DCDATA3	-.12**	.01	-.08	-.11	.08	-.12*	–	–	–

N = 583. Preference = Career Decision Ambiguity Tolerance-Preference; Tolerance = Career Decision Ambiguity Tolerance-Tolerance; Aversion = Career Decision Ambiguity Tolerance-Aversion; CC = CIP65-Choice/Commitment Anxiety; LR = CIP65-Lack of Readiness;

NNA = CIP65-Neuroticism/Negative Affectivity; IC = CIP65-Interpersonal Conflicts. Numbers indicate assessment time, e.g., NNA1 = Neuroticism/negative affectivity at wave 1. The prefix of "D" represents "dummy"

4 RESULTS

Table 2 shows means, standard deviations, Cronbach's alphas, and correlations among preference, tolerance, aversion, neuroticism/negative affectivity, choice/commitment anxiety, lack of readiness, and interpersonal conflicts across three waves.

Table 2. *Means, Standard Deviations, Cα, and Correlations among Variables*

	N	Mean	SD	Cα	NNA1	CC1	LR1	IC1	NNA2	CC2	LR2	IC2	NNA3	CC3	LR3	IC3
NNA1	575	73.67	21.16	0.94	1.00											
CC1	575	82.16	27.06	0.97	$.54^{**}$	1.00										
LR1	575	32.32	11.05	0.91	$.27^{**}$	$.23^{**}$	1.00									
IC1	575	13.20	7.23	0.88	$.40^{**}$	$.48^{**}$	$.28^{**}$	1.00								
NNA2	278	73.37	19.99	0.94	$.80^{**}$	$.44^{**}$	$.26^{**}$	$.33^{**}$	1.00							
CC2	278	78.36	26.44	0.97	$.46^{**}$	$.77^{**}$	$.27^{**}$	$.44^{**}$	$.56^{**}$	1.00						
LR2	278	32.32	9.78	0.88	$.31^{**}$	$.34^{**}$	$.67^{**}$	$.37^{**}$	$.27^{**}$	$.32^{**}$	1.00					
IC2	278	14.03	7.72	0.90	$.31^{**}$	$.39^{**}$	$.29^{**}$	$.69^{**}$	$.38^{**}$	$.51^{**}$	$.37^{**}$	1.00				
NNA3	101	74.76	22.10	0.95	$.77^{**}$	$.50^{**}$	$.28^{**}$	$.25^{*}$	$.70^{**}$	$.47^{**}$	.13	.21	1.00			
CC3	101	83.15	26.83	0.97	$.58^{**}$	$.73^{**}$	$.26^{**}$	$.43^{**}$	$.53^{**}$	$.84^{**}$	.12	$.35^{**}$	$.67^{**}$	1.00		
LR3	101	32.56	12.86	0.94	.08	.09	$.51^{**}$	$.20^{*}$	-.07	.07	$.62^{**}$	.21	$.26^{**}$	.16	1.00	
IC3	101	14.15	8.78	0.95	$.36^{**}$	$.32^{**}$	.19	$.61^{**}$	$.36^{**}$	$.49^{**}$	.14	$.68^{**}$	$.44^{**}$	$.48^{**}$	$.31^{**}$	1.00

N = 583. CDATP = Career Decision Ambiguity Tolerance-Preference; CDATT = Career Decision Ambiguity Tolerance-Tolerance; CDATA = Career Decision Ambiguity Tolerance-Aversion; CC = CIP65-Choice/Commitment Anxiety; LR = CIP65-Lack of Readiness; NNA = CIP65-Neuroticism/Negative Affectivity; IC = CIP65-Interpersonal Conflicts. Numbers indicate assessment time, e.g., NNA1 = Neuroticism/negative affectivity at wave 1.

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Table 2 *(cont'd)*

	N	Mean	SD	Cα	NNA1	CC1	LR1	IC1	NNA2	CC2	LR2	IC2	NNA3	CC3	LR3	IC3
CDATP1	579	35.48	5.62	0.79	.02	.15**	-.49**	-.15**	-.01	.09	-.24**	-.12*	.20*	.17	-.25*	-.03
CDATT1	579	29.29	5.86	0.74	-.15**	.09*	-.36**	.04	-.18**	.05	-.20**	.05	-.06	.06	-.30**	-.07
CDATA1	579	23.40	6.91	0.82	.56**	.60**	.22**	.32**	.48**	.55**	.32**	.29**	.52**	.50**	.05	.25*
CDATP2	280	35.24	5.54	0.79	-.09	.07	-.33**	-.15*	-.07	.10	-.45**	-.11	.11	.24*	-.23	.07
CDATT2	280	28.73	5.84	0.77	-.21**	-.04	-.24**	-.03	-.21**	.00	-.34**	.02	-.21	-.05	-.20	.02
CDATA2	280	24.27	7.24	0.87	.48**	.50**	.27**	.32**	.55**	.61**	.27**	.35**	.47**	.68**	-.05	.44**
CDATP3	111	35.75	5.17	0.79	.10	.11	-.32**	-.01	-.10	-.03	-.44**	-.10	-.03	.03	-.51**	-.13
CDATT3	111	27.44	6.80	0.80	-.05	.08	-.16	.02	-.09	.12	-.22	.01	-.21*	-.03	-.38**	-.15
CDATA3	111	24.60	7.22	0.87	.66**	.61**	.25**	.27**	.58**	.55**	.17	.25*	.66**	.67**	.20*	.38**

N = 583. CDATP = Career Decision Ambiguity Tolerance-Preference; CDATT = Career Decision Ambiguity Tolerance-Tolerance; CDATA = Career Decision Ambiguity Tolerance-Aversion; CC = CIP65-Choice/Commitment Anxiety; LR = CIP65-Lack of Readiness; NNA = CIP65-Neuroticism/Negative Affectivity; IC = CIP65-Interpersonal Conflicts. Numbers indicate assessment time, e.g., NNA1 = Neuroticism/negative affectivity at wave 1.

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Table 2 *(cont'd)*

	N	Mean	SD	Cα	CDATP1	CDATT1	CDATA1	CDATP2	CDATT2	CDATA2	CDATP3	CDATT3	CDATA3
CDATP1	579	35.48	5.62	0.79	1.00								
CDATT1	579	29.29	5.86	0.74	.44**	1.00							
CDATA1	579	23.40	6.91	0.82	.01	-.15**	1.00						
CDATP2	280	35.24	5.54	0.79	.48**	.22**	-.13*	1.00					
CDATT2	280	28.73	5.84	0.77	.24**	.59**	-.16**	.34**	1.00				
CDATA2	280	24.27	7.24	0.87	-.03	-.12*	.58**	-.08	-.12*	1.00			
CDATP3	111	35.75	5.17	0.79	.49**	.31**	.10	.57**	.25*	-.07	1.00		
CDATT3	111	27.44	6.80	0.80	.32**	.62**	-.19*	.18	.54**	-.13	.40**	1.00	
CDATA3	111	24.60	7.22	0.87	.15	-.27**	.75**	.20	-.24*	.69**	-.03	-.30**	1.00

N = 583. CDATP = Career Decision Ambiguity Tolerance-Preference; CDATT = Career Decision Ambiguity Tolerance-Tolerance; CDATA = Career Decision Ambiguity Tolerance-Aversion; CC = CIP65-Choice/Commitment Anxiety; LR = CIP65-Lack of Readiness; NNA = CIP65-Neuroticism/Negative Affectivity; IC = CIP65-Interpersonal Conflicts. Numbers indicate assessment time, e.g., NNA1 = Neuroticism/negative affectivity at wave 1.

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Table 3 summarizes model fit indices for all competing models. As can be seen by the values of CFI (.74), RMSEA (.074), and SRMR (.13), Model 0 with career decision ambiguity tolerance leading to subsequent career indecision was a poor representation of the data. I then specified Model 1 with reciprocal predictions of career decision ambiguity tolerance and career indecision on each other. As can be seen by the values of CFI (.77), RMSEA (.074), and SRMR (.09), Model 1 also fit the data poorly. However, the corrected chi-square difference test between Model 0 and Model 1 was significant, scaled $\Delta\chi2$ (18, N = 583) = 72.41, $p < .05$, indicating that Model 1 was a better representation of the data compared to Model 0. It was thus suggested that career indecision predicted subsequent career decision ambiguity tolerance.

Table 3. *Summary of Model Fit Index for Model Comparison*

	χ^2	df	CFI	RMSEA		SRMR
				Estimate	90% C. I.	
Model 0. Model with ambiguity tolerance effects only	656.75	157	0.74	0.074	[.068, .080]	0.13
Model 1. Model 0 with reciprocal effects	584.62	139	0.77	0.074	[.068, .081]	0.09
Model 2. Model 1 with correlations at wave 2&3	245.40	97	0.92	0.051	[.043, .059]	0.07
Model 3. Model 2 with equivalent cross-time effects	260.16	122	0.93	0.044	[.037, .052]	0.07
Model 4. Model 3+deleting non-significant predictions	278.89	136	0.93	0.043	[.035, .050]	0.09
Model 5. Model 4+CC->Preference	271.17	135	0.93	0.042	[.034, .049]	0.09

N = 583. Preference = Career Decision Ambiguity Tolerance-Preference; CC = CIP65-Choice/Commitment Anxiety.

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Based on Model 1, an examination of the modification indices suggested that the residuals of career ambiguity tolerance and career indecision were correlated at wave 2 and 3. The results thus indicated that the changes of career decision ambiguity tolerance and career indecision could be accounted for by factors other than ambiguity tolerance and indecision. This finding made theoretical sense that in reality career decision ambiguity tolerance and career indecision certainly could be intervened by other factors. I then specified Model 2 based on Model 1, but adding correlations between career decision ambiguity tolerance and career indecision at wave 2 and 3. As can be seen by the values of CFI (.92), RMSEA (.051), and SRMR (.07), Model 2 fit the data well. The corrected chi-square difference test between Model 1 and Model 2 was significant, scaled $\Delta\chi2$ (42, N = 583) = 317.23, $p < .05$, indicating that Model 2 was a better representation of the data compared to Model 1.

While the general reciprocal pattern was supported by Model 2, I continued to specify Model 3 by constraining longitudinal predictions across waves to be equal. For example, the prediction of preference at wave 1 on lack of readiness at wave 2 was set to be equivalent to the prediction of preference at wave 2 on lack of readiness at wave 3 (i.e., path pl1 = path pl2). As can be seen by the values of CFI (.93), RMSEA (.046), and SRMR (.07), Model 3 fit the data well. The corrected chi-square difference test between Model 2 and Model 3 was not significant, scaled $\Delta\chi2$ (18, N = 583) = 14.00, $p > .05$, indicating that Model 3 did not worsen the model fit compared to Model 2. It was thus suggested that the reciprocal prediction pattern was repeated between wave 1->2 and wave 2->3, which further strengthened the validity of the reciprocal model.

An examination of individual path coefficients in Model 3 revealed that preference did not predict subsequent lack of readiness, tolerance did not predict

subsequent neuroticism/negative affectivity, choice/commitment anxiety, lack of

readiness, and interpersonal conflicts, and aversion did not predict subsequent

interpersonal conflicts. The results thus suggested that preference did not impact

subsequent lack of readiness, tolerance was not predictive of subsequent career

indecision, and interpersonal conflicts had nothing to do with career decision

ambiguity tolerance.

I therefore specified Model 4 by deleting non-significant paths in Model 3. As

can be seen by the values of CFI (.93), RMSEA (.043), and SRMR (.09), Model 4 fit

the data adequately. The corrected chi-square difference test between Model 3 and

Model 4 was not significant, scaled $\Delta\chi2$ (14, N = 583) = 19.31, $p > .05$, indicating that

Model 4 fit the date equivalently relative to Model 3. However, an examination of the

model modification indices suggested that choice/commitment anxiety predicted

subsequent preference. This longitudinal prediction was plausible as individuals with

difficulty in committing to a career choice are likely to demonstrate more motivation

in seeking new information.

Thus, I specified Model 5 based on Model 4 by adding paths from

choice/commitment anxiety to subsequent preference. As can be seen by the values of

CFI (.93), RMSEA (.042), and SRMR (.09), Model 5 fit the data adequately. The

corrected chi-square difference test between Model 4 and Model 5 was significant,

scaled $\Delta\chi2$ (1, N = 583) = 7.72, $p < .05$, indicating that Model 5 was a better

representation of the data relative to Model 4. This model (see Figure 2) was thus

retained as the final model representing the dynamic relational pattern of career

decision ambiguity tolerance and career indecision over time. The regression paths

indicated that choice/commitment anxiety led to increased preference and lack of

readiness led to decreased preference. It was also indicated that aversion led to

increased neuroticism/negative affectivity, choice/commitment anxiety, and lack of readiness, and vice versa.
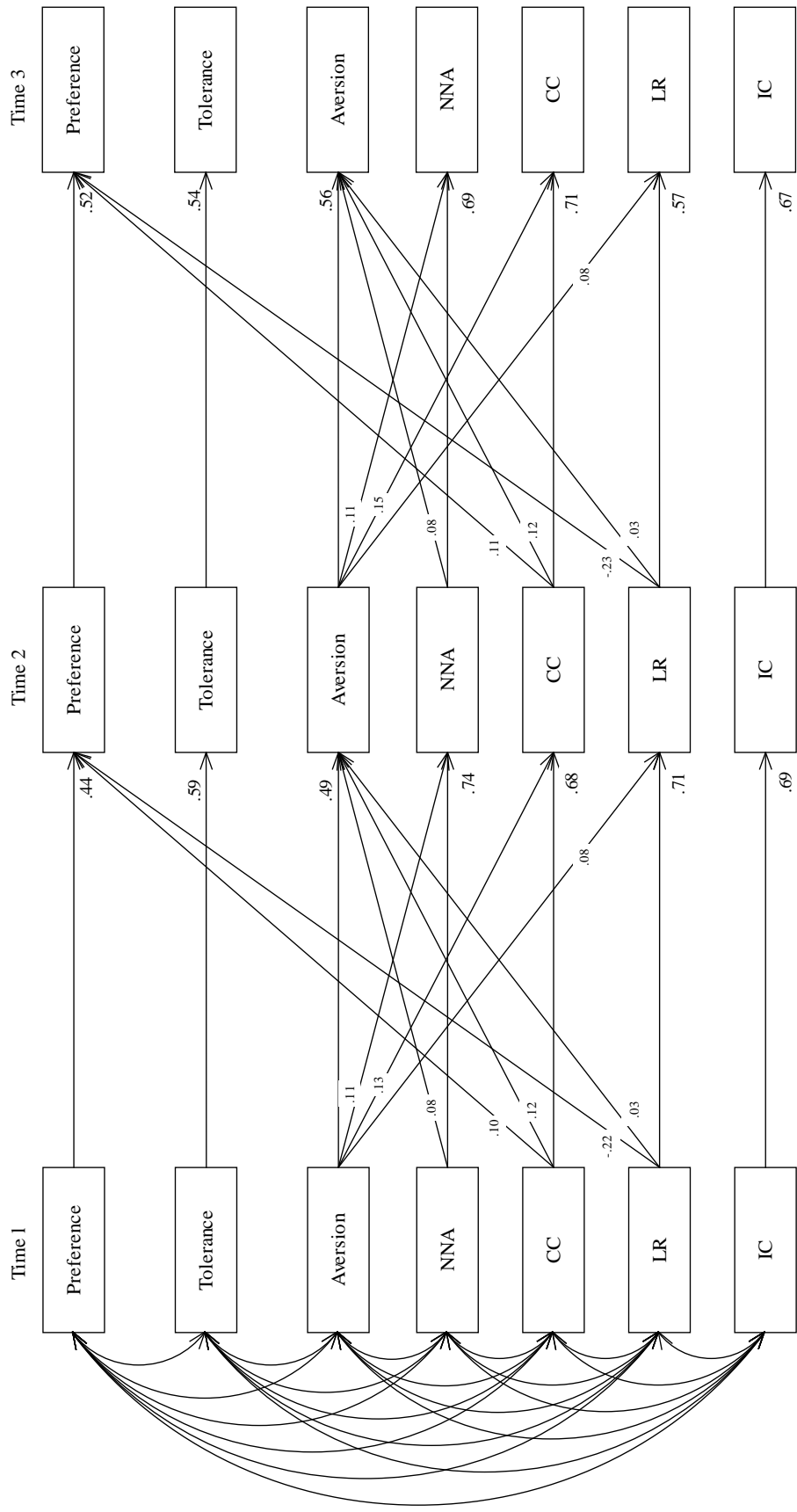
Figure 2. The Final Reciprocal Longitudinal Structural Model.
Preference = Career Decision Ambiguity Tolerance-Preference; Tolerance = Career Decision Ambiguity Tolerance-Tolerance; Aversion = Career Decision Ambiguity Tolerance-Aversion; CC = CIP65-Choice/Commitment Anxiety; LR = CIP65-Lack of Readiness; NNA = CIP65-Neuroticism/Negative Affectivity; IC = CIP65-Interpersonal Conflicts.

While it would be interesting to examine gender invariance of the dynamic relations among career decision ambiguity tolerance and career indecision, the relative small sample size for male students prohibited this analysis. It turned out that Model 3 did not converge for the sample of male students. Therefore, gender invariance was not examined for the dynamic relations of interests.

However, I proceeded to examine the role of gender in the mean levels and the longitudinal development of career decision ambiguity tolerance and career indecision over time. Table 4 shows means and standard deviations of preference, tolerance, aversion, neuroticism/negative affectivity, choice/commitment anxiety, lack of readiness, and interpersonal conflicts across gender at the three waves.

Table 4. *Means and Standard Deviations of Variables across Gender and Assessment Time*

Measure	Time 1		Time 2		Time 3	
	Mean	*SD*	Mean	*SD*	Mean	*SD*
Career decision ambiguity tolerance						
CDATP						
Males	33.52	6.66	33.86	5.29	34.05	4.62
Females	36.46	4.72	35.49	4.58	35.45	3.54
CDATT						
Males	29.16	6.50	28.98	4.99	27.72	5.18
Females	29.33	5.51	28.85	4.90	27.73	4.92
CDATA						
Males	22.54	6.97	23.61	5.71	22.50	5.30
Females	23.83	6.85	24.42	6.25	24.28	5.59
Career indecision						
NNA						
Males	67.21	21.77	67.24	18.67	68.44	18.72
Females	76.89	20.00	75.62	18.19	75.43	17.61
CC						
Males	80.06	25.55	75.98	21.27	77.94	19.12
Females	83.13	27.56	79.83	24.55	80.86	21.91
LR						
Males	33.99	13.25	33.72	9.57	34.25	10.49
Females	31.45	9.61	32.56	8.77	32.62	8.20

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IC

Males	13.72	7.36	14.90	6.16	13.85	6.05
Females	12.94	7.13	14.02	6.80	13.58	6.41

N = 583. CDATP = Career Decision Ambiguity Tolerance-Preference; CDATT = Career Decision Ambiguity Tolerance-Tolerance; CDATA = Career Decision Ambiguity Tolerance-Aversion; CC = CIP65-Choice/Commitment Anxiety; LR = CIP65-Lack of Readiness; NNA = CIP65-Neuroticism/Negative Affectivity; IC = CIP65-Interpersonal Conflicts. Numbers indicate assessment time, e.g., NNA1 = Neuroticism/negative affectivity at wave 1.

Table 5 summarizes results for the repeated-measure multivariate analysis of variance (MANOVA) on career decision ambiguity tolerance and career indecision.

Table 5. *MANOVA Results*

Within Effects				Between Effects			
variables	*F*	*Sig.*	*eta²*	variables	*F*	*Sig.*	*eta²*
Career decision ambiguity tolerance							
time	19.59[a]	0.000	0.170	Gender	14.67[b]	0.000	0.070
time * gender	5.08[a]	0.000	0.050				
Career indecision							
time	23.92[c]	0.000	0.250	Gender	14.61[d]	0.000	0.090
time * gender	3.08[c]	0.000	0.040				

[a]*df* for *F* = 6, 571; [b] *df* for *F* = 3, 574; [c] *df* for *F* = 8, 569; [d] *df* for *F* = 4, 573;

The MANOVA on career decision ambiguity tolerance yielded significant within-subject effects for time (F (6, 571) = 19.59, $p < .05$, $eta^2 = .17$) and time and gender interaction (F (6, 571) = 5.08, $p < .05$, $eta^2 = .05$). It was also demonstrated that there was a significant between-subject effect for gender (F (3, 574) = 14.67, $p < .05$, $eta^2 = .07$). The following univariate analyses revealed that tolerance increased over time and aversion increased and then decreased over time. It was also found that females endorsed higher values of preference and aversion than males. However,

females showed a pattern of decreasing preference over time, while males showed a pattern of increasing preference over time.

The MANOVA on career indecision yielded significant within-subject effects for time ($F_{(8, 569)} = 23.92$, $p < .05$, $eta^2 = .25$) and time and gender interaction ($F_{(8, 569)} = 3.08$, $p < .05$, $eta^2 = .04$). It was also demonstrated that there was a significant between-subject effect for gender ($F_{(4, 573)} = 14.61$, $p < .05$, $eta^2 = .09$). The following univariate analyses revealed that choice/commitment anxiety decreased and then increased over time, while interpersonal conflicts increased and then decreased over time. It was also found that females endorsed higher values of neuroticism/negative affectivity and lower values of lack of readiness compared to males. However, the gap of neuroticism/negative affectivity across females and males was decreasing over time.

5 DISCUSSION

This study examined a reciprocal model of career decision ambiguity tolerance and career indecision predicting each other over three longitudinal assessments. The reciprocal pattern was supported in the dynamic interplay of aversion with neuroticism/negative affectivity, choice/commitment anxiety, and lack of readiness. However, choice/commitment anxiety and lack of readiness were also found to predict subsequent preference.

More specifically, aversion was found to positively predict subsequent neuroticism/negative affectivity, choice/commitment anxiety, and lack of readiness positively. This result has multiple implications regarding career decision making and career counseling. First, it was suggested that individuals with less anxiety and avoidance of ambiguity in career decision making would encounter less negative feelings subsequently in career decision making. The result thus portrays ambiguity as an important source for negative experiences such as anxiety in career decision making.

Second, it was suggested that individuals with less anxiety and avoidance of ambiguity in career decision making would find it easier to commit to a single career choice. While choice/commitment anxiety has been proposed as a major category of career indecision for decades (Chartrand et al., 1990; Gati et al., 1996), surprisingly there has been a scarcity of research or theoretical essays accounting for specific precedents of choice/commitment anxiety (Xu et al., 2014). Commonly, choice/commitment anxiety has been associated with trait anxiety and general indecisiveness in career indecision models, such as the CFI by Chartrand and her colleagues (1990). While this perspective emphasizes the root of choice/commitment anxiety in more global individual differences, it does not inform career counseling

practice of specific situational sources of choice anxiety that can be intervened in career decision making. The current finding is thus an important piece of information revealing that reducing ambiguity aversion could be a plausible objective for career counseling with respect to reducing choice/commitment anxiety.

Third, the link of aversion leading to subsequent lack of readiness suggested that individuals with less anxiety and avoidance of ambiguity would develop a better motivation for career decision making. The past research has revealed that career decision-making self-efficacy was positively related to readiness for career decision making and it medicated the link of ambiguity tolerance with lack of readiness (Xu & Tracey, 2015a). Consistent with the previous cross-sectional research, the current longitudinal finding supported that reducing anxiety and avoidance with ambiguity in career decision making could potentially help individuals initiate and engage in the career decision-making process.

The findings of aversion leading to subsequent change in neuroticism/negative affectivity, choice/commitment anxiety, and lack of readiness together portray aversion as the most important factor of career decision ambiguity tolerance in the career decision-making process. The previous research has found that preference was more associated with career exploration and aversion was more associated with career indecision (Xu et al., 2016). The present results serve as another piece of evidence supporting the differential roles of preference and aversion in career decision making. It was thus suggested that career interventions focused on helping individuals reduce their anxiety and avoidance associated with ambiguity could potentially help individuals reduce their negative feelings, choice anxiety, and hesitance for career decision-making. Certainty strict causal dynamic of aversion causing elevated neuroticism/negative affectivity, choice/commitment anxiety, and lack of readiness

cannot be fully assessed without an experimental design. However, the current results are promising in support of such a causal relation.

In addition to the longitudinal predictions of aversion on neuroticism/negative affectivity, choice/commitment anxiety, and lack of readiness, the current study also found the reverse longitudinal predictions of neuroticism/negative affectivity, choice/commitment anxiety, and lack of readiness on subsequent aversion. It was indicated that the indecision status resulted from negative emotions, commitment difficulty, and motivation deficit led to an elevated level of anxiety and avoidance with ambiguity in career decision making. It is not surprising that individuals with career indecision tend to experience anxiety, as the research repeatedly demonstrated (Campagna & Curtis, 2007; Fuqua et al., 1988; Fuqua et al., 1987; Hawkins et al., 1977). This indecision-induced anxiety could escalate the tendency to perceive ambiguity in career decision making as an undesirable barrier and consequently could fuel avoidance responses. The current finding of three factors of indecision leading to more ambiguity aversion thus echoes with the social implication of career indecision articulated by Krumboltz (1992). Together the reciprocal pattern of aversion and important indecision categories (i.e., neuroticism/negative affectivity, choice/commitment anxiety, and lack of readiness) leading to each other suggested a feedback loop, where reduced/elevated indecision could lead to reduced/elevated aversion and then could lead to reduced/elevated indecision again. In order to use this feedback loop positively and prevent a negative feedback loop, it might be important to help individual obtain more awareness of the role of career indecision in their dynamic career decision making and normalize their anxiety associated with indecision.

While preference was hypothesized to predict subsequent lack of readiness, the current study did not reveal such a temporal prediction. However, the reciprocal prediction of lack of readiness on subsequent preference was supported. These results collectively suggested that lack of readiness precedes preference. It was indicated that people's higher motivation for career decision making could lead to more interest in new information and individuals hesitant at initiating the career decision-making process would exhibit a diminished interest in new information. The current study also found that choice/commitment anxiety positively predicted subsequent preference and lack of readiness negatively predicted subsequent preference. The results thus suggested that individuals with more difficulty committing to a career choice would exhibit more interests in new information. This link reflects the natural tendency that people look for new information when they have difficulty in selecting the best choice, although reducing anxiety with ambiguity has been suggested as another plausible strategy by this study.

It was noteworthy that tolerance had no longitudinal association with the four domains of career indecision all through the three assessments. While I expected that individuals with more confidence and acceptance about ambiguity in career decision making would exhibit less career indecision subsequently, the results were not supportive of this hypothesis. The current finding could speak to the measurement and theoretical issue of tolerance again. It has been found that the factor of tolerance in CDAT was less coherent and consistent than the other two factors of preference and aversion (Xu & Tracey, 2015b). The cross-cultural research also indicated that the factor of tolerance did not hold in Chinese culture (Xu et al., 2016). Given the factor that currently tolerance embraces two aspects of confidence and acceptance, future

evolement of CDAT measurement by separating and enhancing the measurement of these two aspects could be necessary and meaningful.

The present study revealed that interpersonal conflicts had nothing to do with aversion, which is different from my hypothesis. I hypothesized originally that people more comfortable with ambiguity in career decision making tend to experience less indecision due to interpersonal conflicts, because they could accept informational inconsistency better. However, the results indicated that interpersonal conflicts couldn't be buffered or exacerbated by people's ambiguity aversion in terms of its impact on career decision making.

This study revealed gender differences in preference and aversion. It was found that female students tended to find new information more interesting and exciting than male students, while male students tended to exhibit less anxiety and avoidance regarding ambiguity in career decision making than female students. The gender difference in preference was consistent with the previous findings of gender differences in interests that females are more interested in new and artistic things than males (Su, Rounds, & Armstrong, 2009; Tracey & Robbins, 2005; Xu & Tracey, 2016). The gender difference in aversion was not surprising as there has been substantial evidence suggesting that females tend to report more fear and anxiety than males (McLean & Anderson, 2009).

The present study also found gender differences in neuroticism/negative affectivity and lack of readiness. It was indicated that compared to male students female students tended to experience more negative feelings in career decision making, while male students tended to report less motivation for career decision making than female students. The gender difference in neuroticism/negative affectivity could be another example reflecting the tendency of females experiencing

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more fear and anxiety than males (McLean & Anderson, 2009). Interestingly males were found to exhibit less readiness to initiate career decision making than female students in this study, which served as another piece of evidence supporting the previously revealed finding that female students exhibited higher career maturity than male students (Luzzo, 1995).

There are several limitations regarding the conclusions drawn from this study and suggestions for future research. First, the current study only used a sample of college students. The results thus might not generalize to other populations. Future research replicating the current longitudinal investigation in adults, particularly in adults facing career transitions, could provide additional information regarding the validity of the dynamic pattern found in this study. Second, it could be worth replicating the current study with longer temporal intervals in order to see the longer predictions of career decision ambiguity tolerance and career indecision on each over time. The current study had three assessments with roughly two-month intervals. The relatively short period between two assessments might only generate limited changes in career decision ambiguity tolerance and career indecision. The significance and magnitude of the prediction paths could be thus affected. Third, the current study examined the dynamic interplay of career decision ambiguity tolerance with career indecision based on the three factor model of the CDAT and the four factor model of the CIP-65. However, an improved measurement model of career decision ambiguity tolerance could potentially provide a better investigation in future research, particularly given the measurement issue of tolerance. As the current research has revealed the important role of aversion in career indecision, the future research examining potential factors contributing to ambiguity aversion would be helpful for career interventions. The current study suggested that career decision ambiguity tolerance is

more malleable than career indecision, given its weaker temporal stability indicated by weaker within-construct predictions. However, it would be interesting and necessary to examine the joint issue of stability and change of career decision ambiguity tolerance in future research, as it could provide critical information regarding the nature of this construct.

On a whole, the current study was a valuable extension of the previous cross-sectional and non-directional research of the association between career decision ambiguity tolerance and career indecision. While it has been increasingly argued that ambiguity is an important aspect of career decision making and how to handle this ambiguity is critical in terms of career decision outcomes (Xu et al., 2016; Xu & Tracey, 2014, 2015a; Xu & Tracey, 2015b), the dynamic direction of the association cannot be adequately assessed without temporal assessments. The current longitudinal links further supported the role of career decision ambiguity tolerance in the subsequent changes of career indecision, which served as the empirical foundation for the validity of career interventions focused on career decision ambiguity tolerance. On the other hand, it was found that career indecision had reciprocal predictions on career decision ambiguity tolerance, which spoke to the preceding role of career indecision in the subsequent career decision-making process. Collectively the present results implied that it is important and beneficial to help individuals reduce their aversion towards ambiguity with respect to career indecision and reduced career indecision would initiate a positive loop leading to future reduction of career indecision. While career decision-making self-efficacy and career indecision have been widely endorsed as two important career decision constructs (Lent & Brown, 2013; Osipow, 1999), the current study with the previous research (Xu et al., 2016; Xu & Tracey, 2014, 2015a; Xu & Tracey, 2015b) together portrayed career decision

ambiguity tolerance as another important process and outcome construct in career

decision making.

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APPENDIX A

CAREER DECISION AMBIGUITY TOLERANCE

1. It is interesting to discover new strengths and weaknesses
2. I am interested in exploring the many aspects of my personality and interests
3. I am excited to see a creative way to match my interests with a career
4. I am not interested in knowing new information about myself
5. I am excited that I can learn new things about myself or about the world when making a career decision
6. I am open to careers which I have never heard of or thought of before
7. I do not mind changing my career in the future if necessary
8. I am tolerant with the possibility that my interests could change in the future
9. I am tolerant of the unpredictability of a career
10. I enjoy tackling complex career decision making tasks
11. I am tolerant of the potential difference between my perception and the reality of a career
12. I am able to make a choice when multiple options seem equally appealing
13. People's different or sometimes contradictory perspectives about a career makes me uncomfortable
14. I try to avoid complicated career decision making tasks
15. The career decision making process, which involves so many considerations, is just daunting
16. I find it difficult to make career decision as things cannot be predicted clearly
17. I try to avoid a career in which the prospects cannot be foreseen clearly
18. I am afraid of sorting out the complex aspects of a career

APPENDIX B

CAREER INDECISION PROFILE

1 When I experience a setback, it takes me a long time to feel good again.
2 I often feel like crying.
3 I'd be going against the wishes of someone important to me if I follow the career path that most interests me.
4 I am uncomfortable committing myself to a specific career direction.
5 I strive hard to achieve my goals.
6 I often feel tired and worn out.
7 I frequently feel overwhelmed.
8 I am easily embarrassed.
9 I think I take failures and setbacks harder than a lot of people I know.
10 I really have a hard time making decisions without help.
11 I need to learn more about what I want from a career.
12 My interests change so much that I cannot focus on one specific career goal.
13 I often feel discouraged about having to make a career decision.
14 I plan ahead when I have to make an important decision.
15 I sometimes feel directionless.
16 I always think carefully about decisions I have to make.
17 I worry about what other people think of me.
18 I'm having a hard time trying to decide between a couple of good career options.
19 I thoroughly consider the consequences of a decision before I make it.
20 I need a clearer idea about my abilities and talents before I can make a good career decision.
21 I'm conflicted because I find a number of different careers appealing.
22 I need to learn more about myself before I can make a good career decision.
23 When bad things happen in my life, I just keep going because I know things will get better soon.
24 It's difficult for me to choose a career because I like so many different things.
25 If something goes wrong, I have a hard time forgetting about it and concentrating on present tasks.
26 I often hope that my problems would just go away.
27 I usually am able to carry out the plans I make.
28 I like to keep myself open to various career opportunities rather than committing to a particular career.
29 People who are important to me give me contradictory information about the career I should pursue.
30 I think I am a worthwhile person.
31 I feel very confident that I will be able to achieve my career goals.
32 I feel stuck because I don't know enough about occupations to make a good career decision.
33 Important people in my life do not support my career plans.
34 I often get so sad that it's hard to go on.
35 I am familiar with my career options, but I'm just not ready to commit to a specific occupation.
36 Given enough time and effort, I believe I can solve most problems that confront me.
37 I am a worrier.
38 When making important decisions, I tend to focus on what will go wrong.
39 I often feel fearful and anxious.

40 After I have made a decision about an important issue, I continue to think about the alternatives I didn't choose.

41 I have found myself sleeping a lot less or a lot more recently.

42 I need to learn more about the interests I have before I can make a good career decision.

43 Important people in my life disagree about the career I should pursue.

44 I often feel insecure.

45 Stressful situations frequently make me ill.

46 I often feel ashamed of myself.

47 I'm concerned that my interests may change after I decide on a career.

48 I am quite confident that I will be able to overcome obstacles to getting the career I want.

49 I am not sure I can commit to a specific career because I don't know what other options might be available.

50 I'm concerned that my goals may change after I decide on a career.

51 I try to excel at everything I do.

52 I need more information about occupations in which I might be successful.

53 Important people in my life have discouraged me from pursuing the career I want.

54 I will be able to find a career that fits my interests.

55 I always work productively to get the job done.

56 I don't have enough occupational information to make a good career decision.

57 I need a lot of encouragement and support from others when I make a decision.

58 I need to learn how to go about making a good career decision.

59 I am quite confident that I will be able to find a career in which I'll perform well.

60 I usually don't have a lot of confidence in my decisions unless my friends give me support for them.

61 I need more information about careers I might like.

62 I often feel nervous when thinking about having to pick a career.

63 I'm having a hard time narrowing down my career interests.

64 I verify my information to ensure I have all the facts before making a decision.

65 I don't know much about the occupations I'm considering.

APPENDIX C

INSTITUTIONAL REVIEW BOARD APPROVAL

EXEMPTION GRANTED

Terence Tracey
CLS - Counseling and Counseling Psychology
480/965-6159
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Dear Terence Tracey:

On 7/30/2015 the ASU IRB reviewed the following protocol:

Type of Review:	Initial Study
Title:	Career Decision Ambiguity Tolerance: A Longitudinal Examination of Its relation to Career Indecision
Investigator:	Terence Tracey
IRB ID:	STUDY00002950
Funding:	None
Grant Title:	None
Grant ID:	None
Documents Reviewed:	• Consent form (survey 1).pdf, Category: Consent Form; • Research Measures (survey 2).pdf, Category: Measures (Survey questions/Interview questions /interview guides/focus group questions); • Recruitment script 2.pdf, Category: Recruitment Materials; • Research Measures (survey 1).pdf, Category: Measures (Survey questions/Interview questions /interview guides/focus group questions); • Recruitment script 1.pdf, Category: Recruitment Materials; • Consent form (survey 2).pdf, Category: Consent Form; • HRP-503a - PROTOCOL SOCIAL BEHAVIORAL.docx, Category: IRB Protocol;

APPROVAL: MODIFICATION

Terence Tracey
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Dear Terence Tracey:

On 2/1/2016 the ASU IRB reviewed the following protocol:

Type of Review:	Modification
Title:	Career Decision Ambiguity Tolerance: A Longitudinal Examination of Its relation to Career Indecision
Investigator:	Terence Tracey
IRB ID:	STUDY00002950
Funding:	None
Grant Title:	None
Grant ID:	None
Documents Reviewed:	• Research Measures (survey 2).pdf, Category: Measures (Survey questions/Interview questions /interview guides/focus group questions); • Consent form (survey 2)-Revised.pdf, Category: Consent Form; • Research Measures (survey 1).pdf, Category: Measures (Survey questions/Interview questions /interview guides/focus group questions); • Recruitment script 3.pdf, Category: Recruitment Materials; • Recruitment script 1.pdf, Category: Recruitment Materials; • HRP-503a - PROTOCOL SOCIAL BEHAVIORAL.docx, Category: IRB Protocol; • Recruitment script 2.pdf, Category: Recruitment Materials; • Research Measures (survey 3).pdf, Category: Measures (Survey questions/Interview questions