The Effect of Critical Thinking on Adolescent-Parent Career Congruence among Undergraduate Students in Taiwan: Friendship Quality as the Mediator

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Abstract

This research paper presents empirical evidence aimed at establishing a causal relationship between explicit critical thinking skills and adolescent-parent career congruence among undergraduate students. Additionally, it seeks to identify the mediating role of friendship quality in this relationship. The study employs structural equation modeling as a method to establish causality. The findings of this research have implications for educators and instructors in higher education, as well as career exploration consultants in schools. The study provides valuable evidence on the most effective approach to promoting adolescent-parent career congruence by utilizing critical thinking skills and fostering high-quality friendships.

Keywords: adolescent-parent career congruence, critical thinking, friendship quality, structural equation modelling, college students

1. Introduction

1.1 Previous Research

Adolescence is characterized by multiple developmental transitions, which can create uncertainty, anxiety, and distress that potentially impact adolescents' strivings for peer acceptance, intimacy, and a clear sense of identity. Attachment theory postulates that youth, in the context of their relationships to their parents, develop attitudes and expectations that shape the formation and experience of interpersonal relationships outside of the family context (Bowlby, 1973). Career exploration and choice process involving learning more about yourself, researching your options, trying new experiences are influenced by lots of factors including childhood fantasy, personal skill, interest and talent, previous experience, family, school, culture and society and economic condition. Among these factors, parents' desire or parental pressure, peer persuasion and personality-driven are paramount.

In collectivist societies, where people prioritize group harmony and conformity, adolescents often place significant importance on their parents' opinions and guidance when it comes to choosing a career. They count on their parents laboriously for value obedience and support. In such societies, parental factors play a crucial role in either empowering or constraining an individual's career choices.

1.2 Theoretical Framework

Kaufman et al. (2020) suggested that parents-children relationship and friendship got interaction called Spillover theory. Substitute in one area changed correlates behaviors that extrapolate to the other association area. For example, Poor family feeling was related to bring down friendship quality. The impact of one relationship sphere on the other sphere would develop mental issues (Liu et al., 2020; Mak, Fosco, & Feinberg, 2018). Two principal reasons explained the interaction of friendship and family impact might foremost during early adolescent. First, as children set foot in adolescent, they spent progressively more time with peers than before. Second, the essence of peer relationships become more intimate during adolescent (Larson & Richards, 1991; Berndt, 1996). Intimate friendships first come into sight in pre-Adolescent representing as an overpass from parent–children relation to future peer relation. This kind of friendships is also children's first voluntary nature of friendships is the first intimacy relationships (Sullivan, 1953). Friendship quality consists of positive dimensions, such as intimacy and

validation, as well as negative dimensions, such as conflict and betrayal (Berndt, 2004). Friendships serve as resources for comprehending about self-esteem and others and set off prototype for propinquity in adulthood. Continuing of friendships in middle childhood needs that children progress and learn social skills, such as empathy and self-disclosure, which is not similar to friendship in childhood.

From the point of view of buffering hypothesis, studies revealed that high-quality father-child relationship may reduce the gloomy consequences of a poorly functioning mother-child relationship (Hetherington, 1978). Parents take roles as a paramount socialization function in the lives of children, if neglectful or authoritarian and inconsistent practicing, then child outcomes is often problematic and low level of confidence (Bugental & Goodnow, 1998). Families are like social systems. To realize the behavior of one member of the family, the complementary behaviors of other members are also required to be evaluated (Parke & Buriel, 2008). That is, perfectly friendship relationships have been recognized as a feasible protective factor for hazard adolescents. High-quality friendships or a reciprocated best friend could also reduce the risk implications of problematic family environments network (Criss, Pettit, Bates, Dodge, & Lapp, 2002).

Career aspirations refer to the goals and choices individuals express regarding their vocational path. Setting career goals is crucial for the development of one's vocational identity, as noted by Erikson (1968). Two primary types of goal orientations have been identified: mastery-approach and performance-approach (Elliot, 2005). Mastery-approach individuals focus on skill development and improvement. Performance-approach can be categorized into performance-approach and performance-avoidance, with the former reflecting a belief in fixed ability. Schoon and Parsons (2002) argued that both individual factors and environmental constraints need to be considered when explaining the formation of career aspirations, and previous studies have shown that both personal and contextual factors influence adolescent career development (Sawitri, Creed, & Zimmer-Gembeck, 2014).

Empirical research has indicated that during middle childhood, individuals start autonomously selecting their peer relationships while considering their qualities. This period is also characterized by an increase in emotional intimacy within friendships, while the importance of companionship and shared activities diminishes. Additionally, they start to hierarchize complex values such as loyalty, openness support in their friendships as children transition into pre-adolescence, as described by Bigelow (1977).

1.3 Research Questions and Hypothesis

Critical thinking, as one kind of individual factors in carrier choice, is the ability to understand assumptions, make claims that are supported by evidence and make conclusions that are warranted by the evidence presented and to evaluate evidence and arguments independently of one's prior beliefs and opinions.

In Taiwan, the collectivism seemed to fall away as young people with critical thinking growing in modern society run after individualism and freedom; however, few studies have examined the role of friendship quality in the relationship between personal factors (critical thinking) and Adolescent-parent career congruence.

2. Background

2.1 Adolescent-Parent Career Congruence

2.1.1 Definition of Adolescent-Parent Career Congruence

Adolescent-parent career congruence refers to the perception of adolescents that their own career interests, aspirations, and plans align closely with those of their parents. Several factors influence the promotion and pursuit of education for career advancement, including personal, educational, and family-related factors. Previous research conducted in collectivist contexts has highlighted the positive effects of mastery-approach and performance-approach orientations on academic performance (Rao, Moely, & Sachs, 2000).

As adolescents progress through early adolescence, they become less influenced by their parents and increasingly prioritize the role of friendships in their overall development (Havewala et al., 2019). Establishing a strong support system and achieving career congruence with parents can provide significant benefits in terms of financial and psychological support, as well as facilitating smoother career development for adolescents.

2.1.2 Collectivist Contexts and Individualist Contexts

Social Cognitive Career Theory addresses the fact that we are likely to consider continuing a particular task if we have had a positive experience doing it.

Self-efficacy beliefs, outcome expectations, and goals are the basic components of SCCT; first, self-efficacy beliefs are assumed to derive from four primary sources of information: personal performance accomplishments, vicarious experiences, social persuasion, and physiological and emotional states; second, outcome expectations

refer to beliefs about the consequences or outcomes of performing particular behaviors; third, personal goals may be defined as one's intentions to engage in a particular activity. There are three models: SCCT's interest model, SCCT's choice model, and SCCT's performance model. In SCCT's interest model, people are likely to form enduring interest in an activity when they view themselves as competent at performing it and when they expect the activity to produce valued outcomes. SCCT's choice model posits conditions that increase the probability that people will be able to pursue their interests as well as conditions where interests may need to be compromised in making career-related choices (e.g. family financial and emotional support). SCCT's performance model is concerned with predicting and explaining two primary aspects of performance: the level of success that people attain in educational and occupational pursuits and the degree to which they persist in the face of obstacles.

In the career area, studies in both individualist (i.e., Western) and collectivist contexts (e.g., southeastern Asia) reveal that mastery-approach is associated positively with career-related variables such as exploration, self-efficacy, decision-making, job-seeking intensity, commitment, and aspirations. Otherwise, the studies in individualist contexts show positive or null associations between performance-approach and career outcomes of exploration, aspirations, and self-efficacy (Creed, King, Hood, & McKenzie, 2009). Mastery-approach individuals focus on developing and improving their skills, they persist and continue with tasks, and gain enjoyment from the challenge. A performance-approach orientation will lead individuals to set higher goals as this can elicit positive feedback from others.

Parenting is a main socialization element that consistently predicts children's behavioral problems. There is an additive model for parenting model. An additive model considers all the possible choices and then systematically evaluating each option which proposed that the contributions of mothers and fathers; emotion socialization practices to child outcomes are cumulative across parents. Researchers studying family "effects" have struggled to address a number of conceptual issues in an integrated analytic paradigm.

We would expect that more supportive reactions reported by both parents would be related to more optimal child outcomes based on this model, whereas harsher reactions reported by both parents would be associated to more problematic functioning (Denham, 1997).

2.2 Critical Thinking

2.2.1 Definition of Critical Thinking

Critical thinking definition and teaching originated from Socrates and Greek skeptics 2500 years ago. Drawing on the origin of the word 'critical', it derives from "late Latin criticus, from Greek krinein 'judge, decide'" with the latter standing as a root for the word 'crisis', as well (Dumitru, 2019). Given many definitions for critical thinking and the lack of consensus among experts, previous authors have proposed different ways of classifying these definitions. The etymology of critical thinking seemed predictive of its theoretical and applied background, leading to various definitions. Lai (2011) suggests that the definitions should be categories according to the author's special domain and also identifies 3 ways to integrate critical thinking into pedagogy. Definitions from the field of philosophy have their roots in ancient Greece and Socratic philosophy, both of which are still valid to this day. In the field of education, in classroom the educational approach, the psychological approach, the philosophical approach in critical thinking is applied with the concept of higher-order thinking.

Dwyer, Hogan, and Stewart (2014) define that, as a metacognitive process through purposeful and reflective judgment, enhanced the opportunity of yield a logical conclusion to a solution to a dilemma issue. "Reflective and reasonable thinking that is focused on deciding what to believe or do" was defined by Ennis (1985). Critical thinking was defined by Facione (1990) as purposeful, self-regulatory judgment which results in interpretation, analysis, evaluation, and inference. It also could explain the conceptual, methodological, evidential, criteriological, or contextual considerations upon which that judgment is based. It applied as an ability to avoid bias in reasoning and decision-making. Thinking is a natural process and can often be biased, distorted, partial, uninformed and potentially prejudiced; excellence in thought must be cultivated (Duron, Limbach, & Waugh, 2006).

2.2.2 Subscales of Critical Thinking

7 subscales of critical thinking were proposed as followed namely, analyticity, self-confidence, open-mindedness, inquisitiveness, systematicity, truth-seeking, and cognitive maturity (Facione et al., 1995). Critical thinking also has two main components, namely critical thinking skills and critical thinking disposition. The skills component refers to the cognitive processes of thinking while the disposition component refers to personal desire and internal motivation for critical thinking. There is a significant positive correlation between critical thinking disposition and critical thinking skills (Zhang & Lambert, 2008; Profetto-McGrath, 2003).

Critical thinking theorists have also revealed many critical thinking skills, such as inference, explanation, interpretation, self-regulation, analysis, and evaluation. Ennis (1990) defined as "reasonable reflective thinking that is focused on deciding what to believe or do". One of the major ambitions of higher education is to foster students' critical thinking in order to prepare them for functioning in a complex and rapidly changing society. Critical thinking skills have been related with higher levels of employment. (Toplak, West, & Stanovich, 2017) In a recent survey by the National Association of Colleges and Employers (NACE, 2017) about the competencies which employers prefer when hiring employees, the results revealed that only 9.9% of senior employees rated themselves as proficient in critical thinking, while 99.2% of employers considered that critical thinking was extremely essential for new hires.

2.2.3 Fostering Critical Thinking

Higher education, as a school for teaching and developing critical thinkers, always emphasizes the acquisition of basic knowledge. However, this emphasis often results in graduates lacking the skills to distinguish between facts and opinions. Additionally, there is a lack of explicit instruction in critical thinking within classes (Shim & Walczak, 2012; See, 2016).

The role of education in fostering critical thinking in students has been stressed since the time of Dewey (1910). There seems to be a growing awareness of the need to prepare students with a knowledge and capacity to take decisions. Traditionally, the role of universities has been to develop independent and critical thinkers (Moore, 1911). Some studies describe the most promising approach to teaching critical thinking skills, such as brainstorming techniques (Ghabanchi & Behrooznia, 2014), journal writing, general critical thinking skills, scaffolding (Sokol, Oget, Sonntag, & Khomenko, 2008), active learning strategies (Kusumoto, 2018), literary and narrative texts (Khatib, Marefat, & Ahmadi, 2012), assessment techniques, and debate.

In this study, researcher assumed critical thinking as a paramount personal factor in the Adolescent-parent career congruence. Many tools were utilized to measure critical thinking, and the most common were California Critical Thinking Skills Test (CCTST) and California Critical Thinking Disposition Inventory (CCTDI) (Azizi-Fini, Hajibagheri, & Adib-Hajbaghery, 2015).

2.3 Friendship Quality

2.3.1 Friendship Development

Friendship quality for adolescents is defined as the perceived support from friends (Furman & Buhrmester, 1992). High quality friendships between adolescents are characterized by closeness, warmth, companionship, and positive reciprocity, with teenagers that had high-quality friendships being found to be better socio-emotionally adjusted and accepted by their peers and had greater degrees of happiness, self-esteem, and life satisfaction (Waldrip et al., 2008; Flynn et al., 2017; Raboteg-Saric & Sakic, 2014).

In the view of the family systems theory, the family is the prominent area for individual socialization, especially in childhood. Children may detect and grasp their parents' responses to their performance and imitate them in a friendship relationship. Parents who adopt success-oriented responses always pay attention to the positive aspects of children and convey praise. Their children also show more affirmation and encouragement to their friends, which may enhance each other's self-worth. Enhancing each other's self-worth is an important feature of high friendship quality (Stearns et al., 2019).

An essential progress in social development that takes place after early childhood is the evolution of dyadic friendships from six to twelve years old. The prior peer experiences are a paramount ingredient of early socialization, defined primarily by proximity and shared activity. Dyadic peer relationships undertake the values of intimate friendship in the middle childhood, for instance, mutual influence, reciprocal recognition of the friendship, relational commitment and a shared history (Howes, 1996; Feldman, 2010).

2.3.2 Friendship Benefits

Friendships serve several psychosocial purposes for adolescents. For example, adolescent friendships enhance development of social skills, intimacy, empathy, perspective-taking skills and conflict resolution; Ingersoll, 1989; Price, 1996). High quality friendship usually interferes with low levels of conflict and high levels of the positive features (Berndt, 2002).

Friendships are an important context to examine ideal career discussion because of the great amount of changes that occur within dyadic friendships from childhood to Adolescent. During childhood, friends are typically same-sex peers that engage in similar activities, have same interests, and are in close proximity (e.g., same school, same neighborhood). Beginning in late childhood, friendships expand beyond same-sex and begin to

fulfill attachment-related needs, such as proximity seeking and emotional support (Bokhorst, Sumter, & Westenberg, 2010; Furman & Buhrmester, 1992). The ways parents answered to their children's poor affect are paramount to their socioemotional develop (Furman & Buhrmester, 1992; Dunsmore & Halberstadt, 1997; Bokhorst, Sumter, & Westenberg, 2010).

High level of friendship quality may serve as a protective factor for family problem. Towering friendship quality can provide adolescent the emotional support and sense of belonging and help to heal emotional neglect in the family trauma and children depressive mood. Thus, friendship quality may moderate the relationship between family risks and adolescents' psychosocial adaptation (Havewala, Felton, & Lejuez, 2019). Moreover, adolescent friendships have been found to be reliable predictors of overall well-being, as well as self-esteem and social adjustment during Adolescent and adulthood (Berndt, 1996; Hartup, 1993; Hartup, 1992).

2.3.3 Negative Aspects of Friendship

Although friendship can serve positive functions for Adolescent, peer relationships can also have negative aspects and lead to maladaptive outcomes such as high levels of aggression, police arrest, antisocial behavior and delinquency especially with deviant and antisocial peers (Capaldi et al., 2001; Vitaro et al., 2000). Good or bad friendship quality have paramount inference for youngster's social and psychosocial growth. Superior friendship qualities are origin of emotional as well and ponderable support and provide companionship. Rubin et al. (2004) suggested youngsters are vulnerable to aggression and loneliness, peer rejection and victimization, internalizing and externalizing problem behaviors and lower levels of prosocial behavior without these needs met. Work-family spillover happens while behaviors, moods, stress and emotions from job are bringing back to the family domain. Spillover effects apply to situations of inter-role conflict. There exists positive spillover (work-family facilitation) and on the other domain, negative spillover (work-family conflict). Study also advocates that peer relationships as moderators of the link between negative parenting and adolescent externalizing behaviors in school. If Adolescents have high-quality friendships and vigorous group affiliations with peers, they might perceive to take part in few antisocial behaviors, the connection between poor parenting and externalizing behavior problems in later life is reduced. (Lansford et al, 2003).

2.3.4 Parent-Child Relationship and Friendship

In the internet era, adolescent with low quality friendships will benefit from internet because constraints that make them interact poorly in real-life face-to-face encounters with their friends are not present so much in an online environment (Campbell et al., 2006). Therefore, adolescents with poor friendships may feel the new online environment an appropriate space to certificate their identity. Building positive friendships is an important aspect of Adolescent, a task for which building trust is vital.

Friendships flourish in entanglement during middle childhood and they occupy paramount part in children's development. Friends are typically same-sex peers that engage in similar activity during childhood, have similar interests or are in close proximity (e.g., same school, same neighborhood). Friendships serve as resources for learning about oneself and others and become prototypes for future relationships (Furman, 1996). Beginning in late childhood, friendships expand beyond this and begin to fulfill attachment-related needs, such as proximity seeking and emotional support (Bokhorst, Sumter, & Westenberg, 2010).

Children are able to apply more intimate aspects of the parent-child relationship to their friendships with gains in cognitive development and realize that friends can be a source of support and intimacy as well. By mid-Adolescent, friends are often regarded more paramount than parents for emotional support (Bokhorst et al., 2010)

2.3.5 Constructs of Friendship Quality

Berndt (1998) claimed that friendship quality should not be confused with other characteristics of the friendship such as conflict, intimacy, companionship. He suggested that friendship quality should be dealt with as a global measure to describe the friendship either as rich or poor in quality regarding to how close to perfect the friendship features are. Friendship quality is a multidimensional construct which is composed of both positive features such as provision of security, companionship, help, intimacy or closeness and a negative feature such as conflict (Gifford-Smith & Brownell, 2003).

Measuring the quality of dimensional friendships concerns the focus on self-perceptions of friends, which is unique and special, and cannot be obtained by peers or adults. Friendships which provide little support can be those with high levels of conflict, or those with low levels of security, companionship, and help (Furman, 1996).

We measured friendship quality along six dimensions with the McGill Friendship Questionnaire: Help (e.g.,

"helps me when I need it"), Intimacy (e.g., "know when something bothers me"), Reliable Alliance (e.g., "would stay my friend even if other people did not like me"), Stimulating Companionship (e.g., "is exciting to talk to"), Self-Validation (e.g., "makes me feel smart"), and Emotional Security (e.g., "Would make me feel calmer if I were nervous") (Mendelson & Aboud, 1999).

2.4 Research Questions

This research focuses on the impact of critical thinking and friendship on parent-Adolescent career congruence.

The main research questions are:

- Is critical thinking had effect on parent- Adolescent career congruence?
- Is friendship quality had effect on parent- Adolescent career congruence?
- What is the mediator role for friendship quality in the relationship between critical thinking and parent-Adolescent career congruence?
- What are the recommendations to promote critical thinking and friendship quality for better career congruence between family?

3. Methodology

This study aims to investigate college students' critical thinking and friendship quality (mediating factor) that would significantly affect the adolescent-parent career congruence in Taiwan, and how these factors can contribute to influence their career congruence.

We identified critical thinking and friendship quality as principal component of this research and collected data by a questionnaire based on the theoretical model from review. 308 Taiwanese college students completed questionnaire consisting of three scales and demographic data. We performed quantitative analyses and structural equation modeling of key elements that affect adolescent- parent career congruence for advising students, school and family on how to guide adolescent to explore their career choice.

3.1 Data Collection and Instrument Validation

We designed three questionnaires Critical Thinking Scale with 7-point Likert scale (Facione,1990), Friendship Quality Scale (Thien, Razak, & Jamil, 2012) with 7-point Likert scale and the Adolescent-Parent Career Congruence Scale (Sawitri, Creed, & Zimmer-Gembeck,2013) with 7-point Likert scale to acquire data for our study.

The final version of the scale included 2 parts. Basic demographic information about the Taiwanese college students, including sex, age, department, and grade is the first part. Three questionnaires focused on the critical thinking, friendship quality and parent-adolescent congruence are the other part. The above scale's items are from research which were well-verified and the anonymity of the data were studied only for the research purpose. The final sample consisted of 308 college students.

3.2 Data Analysis

We utilized SPSS 20 and Amos 18 to analyze the questionnaire data from college students in Taiwan. Researcher performed descriptive analysis by SPSS 20 in the beginning and applied Amos 18 to perform SEM to evaluate the paths of critical thinking on the parent- adolescent career congruence of college students, mediating by friendship quality. The measurement model to confirm the reliability and validity and the structural model to evaluate to test the initial hypotheses were both analyzed to make conclusions.

4. Results

4.1 Demographic of Data

Mean scores were higher for female students than for male in Friendship Quality Closeness subscale (mean=4.89± 1.05vs 4.61 ± 0.94; t=2.53, p<0.05) and Help subscale(mean=5.04± 1.24vs 4.58 ± 1.09; t=3.47, p<0.01).The t test also showed higher mean scores were found for senior students than for junior in Adolescent-Parent Career Congruence Scale subscale (complementary subscale: t=2.41, p<0.05;supplementary subscale: t=2.36, p<0.05) and Critical Thinking scale(t=2.50, p<0.05) in the college students' sample.

The Critical Thinking, Friendship Quality, and Adolescent-Parent Career Congruence Scale's Scores ranged from 1 to 7 Likert Scale. For average score of items of the Critical Thinking Scale only 0.3% of students' choice the lowest score grouping, for average scores of items of the subscales of Friendship Quality Scale between 0.3~0.6% of students' choice the lowest score grouping, and for average scores of the subscales of APCCS only between 0.6%~1.0% of students' choice the lowest score grouping in relation to floor effects.

For average score of items of the Critical Thinking Scale only 3.9% of students' choice the highest score grouping, for average scores of items of the subscales of Friendship Quality Scale between 3.6%~11.7% of students' choice the highest score grouping, and for average scores of the subscales of APCCS 5.5%~6.8% of students' choice the highest score grouping category in relation to ceiling effects. Table 1 revealed the mean, SD, internal consistency, kurtosis and skewness.

Table 1. Mean, S.D., skewness, range, minimum, maximum, skewness, kurtosis for critical thinking, friendship quality subscales, and adolescent-parent career

Scale N=308	Mean	SD	Range	Min	Max	Skew	Kurtosis
Critical Thinking	4.63	1.02	5.50	1.50	7.00	.48	.05
Friend-Safety	4.50	.95	5.38	1.63	7.00	.55	.82
Friend-Closeness	4.75	1.01	5.50	1.50	7.00	.54	.08
Friend-Acceptance	4.72	1.05	5.00	2.00	7.00	.57	.06
Friend-Help	4.81	1.19	6.00	1.00	7.00	.18	-.20
Congruence-Complementary	4.67	1.11	6.00	1.00	7.00	.36	.28
Congruence-Supplementary	4.46	1.08	6.00	1.00	7.00	.33	.94

4.2 Correlation Analyses

The coefficients of the correlations between critical thinking, friendship quality, and adolescent-parent career congruence in college students were measured from 0.35 to 0.87 (p<0.01). Preliminary analysis indicated that critical thinking was positively correlated to the scores of friendship quality subscales significantly as shown in Table 2. The correlation of each subscale was measured in order to study the relationships between critical thinking, friendship quality, and adolescent-parent career congruence in college students. There is a stronger association between critical thinking, friendship quality, and adolescent-parent career congruence. Critical thinking was positively correlated to the measures of adolescent-parent career congruence subscales significantly as well. Friendship quality subscales were also positively correlated to measures of adolescent-parent career congruence subscales significantly.

The results demonstrated that, for these college students those possessing stronger critical thinking, friendship quality in college students were inclined to perform higher adolescent-parent career congruence.

Table 2. Correlations between critical thinking, friendship quality subscales, and adolescent-parent career congruence subscales

Scale N=308	CT	FS	FC	FA	FH	CC	CS
Critical Thinking	-						
Friend-Safety	.48	-					
Friend-Closeness	.54	.76	-				
Friend-Acceptance	.51	.77	.87	-			
Friend-Help	.47	.66	.77	.83	-		
Congruence-Complementary	.61	.48	.56	.55	.50	-	
Congruence-Supplement	.56	.44	.47	.43	.35	.74	-

4.3 Preliminary Model Fit Measure

This study applied SEM to research the relationship between critical thinking, friendship quality, and adolescent-parent career congruence. The testing criteria of model fit contains in the preliminary fit criteria, overall model fit of the structural model, and fit of the measurement model. Error variance was all positive. All univariate indices of skewness and kurtosis of the observation variable as shown in Table 1 were non-problematic (highest skewness value = .57). Standardized error variance was between .017 and .097 (above 0.05). The factor loading of each item variable was significant between .81 and .96 (above 0.50 level). Thus, the model of factors reached the preliminary fit criteria (Bagozzi & Yi, 1988).

4.4 Measurement Model

Critical Thinking Scale, Friendship Quality Scale, and Adolescent-Parent Career Congruence Scale in the pilot study were analyzed with exploratory factor analysis and Cronbach's alpha. The validity and reliability of the instruments and the overall fit of the measurement model were acceptable. The variance extracted for each construct (CTS, FQS, APCCS) were 72.07%, 69.4% and 75.94% and factor loadings ranging from .64 to .87. Cronbach's alpha values of CTS, FQS-S, FQS-C, FQS-A,APCCS-C, APCCS-S were .92, .91, .92, .90, .93, and .92, respectively. The results were deemed satisfactory for validity and reliability of CTS, FQS, and APCCS. Convergent validity should be achieved for fulfilling construct validity. Standardized loading estimates measured from .81 to .96 and the loading estimate of all the subscales were higher than 0.7 which showed satisfactory convergent validity. Anyway, results showed valid and reliable measurement model. The three latent variables (CTS, FQS, APCCS) representing he composite reliabilities were .91, .94 and .86 as shown in Table 3, respectively, exceeding 0.6. Moreover, the average variance extracted from the latent variables of CTS, FQS, APCCS were .68, and .61, respectively, above 0.5.

Table 3. Model evaluation measures of the overall model fit (N=308)

Evaluation items	Analyses results	Evaluation results
Did X^2 reach significance $p>.05$	p=0.00	Not satisfactory
Did X^2/DF <3	CMIN/DF=53.73/24=2.24	Yes
Did GFI >0.9	0.96	Yes
Did TLI (NNFI >0.9)	0.98	Yes
Did CFI >0.9	0.99	Yes
Did IFI >0.9	0.99	Yes
Did NFI >0.9	0.98	Yes
Did RMSEA >0.8	0.06	Yes
Did PNFI >0.5	0.65	Yes
Did PCFI >0.5	0.66	Yes
Did SRMR <0.6	0.03	Yes

4.5 Critical Thinking-Friendship-Congruent Overall Model Fit

Causal relationships between critical thinking, friendship quality, and adolescent-parent career congruence are shown in Figure 1. SEM was conducted to test the validity of the model using a maximum likelihood estimation method and boottrapping. An χ2/df less than 3.0, comparative fit index values>.90, the Tucker-Lewis index >0.9, root mean square error of approximation values <.08 represent an acceptable fit. Fit statistics revealed an acceptable model fit to the data (CMIN=53.73, DF=24, χ2/df=2.24, GFI=.96, AGFI=0.93, NFI=0.98, RFI=0.97, IFI=0.99, TLI=.92, CFI=.93, PNFI=0.65, RMSEA=.06, SRMR=0.03, ECVI=0.31, Hoelter (0.01)=246) (Table 3). College students' critical thinking impacted their career congruence (γ=.52, p< .001), their friendship quality also impacted their career congruence significantly (β=0.32, p<.001). As a result, friendship quality served as mediator variable for the relationship between critical thinking and career congruence in this model. (Kline, 2005)
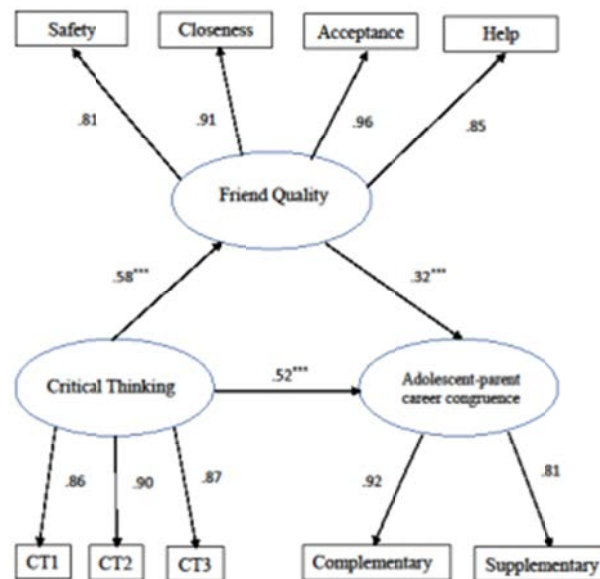
Figure 1. The causal relationships between critical thinking, friendship quality, and adolescent-parent career congruence in SEM model

5. Discussion

This study had investigated the mediating role of friendship quality in the relationships between critical thinking and adolescent-parent career congruence. Findings revealed that there was a positively significant correlation in the relationships between critical thinking, friendship quality, and adolescent-parent career congruence, and suggested that friendship quality was an important mediator variable for critical thinking and adolescent-parent career congruence. Moreover, the study found that friendship quality explained adolescent-parent career congruence, and partially had a mediating role between critical thinking and adolescent-parent career congruence.

Likewise, it was found that critical thinking explained critical thinking and adolescent-parent career congruence both directly and through friendship quality. Research results revealed that the conceptual model developed to holistically describe adolescent-parent career congruence was supported and indicated good-fit values.

The current study enriches expanding part of literature linking critical thinking, friendship quality and Adolescent- parent career congruence in adolescent, guided by theoretical hypotheses and empirical results drawn from earlier investigations,

An extensive review of the friendship literature noticed that there is dubiety regarding the role of friendship quality in adolescent social and psychological development recently.

To the best of our knowledge, this research shows the first attempt to testify critical thinking and Adolescent-parent career congruence among Taiwanese college students and first to explore the mediating role of friendship quality in the relation between critical thinking and Adolescent-parent congruence. Among the demographic characteristics, statistically significant differences in friendship quality were observed in female students and male students and also in Adolescent-parent career congruence and critical thinking in senior students and junior students. Higher mean scores were found for female students than for male in Friendship Quality Closeness subscale (mean=4.89± 1.05vs 4.61 ± 0.94; t=2.53, p<0.05) and Help subscale (mean=5.04± 1.24vs 4.58 ± 1.09; t=3.47, p<0.01). The t test also demonstrated higher mean scores were found for senior students than for junior in Adolescent-Parent Career Congruence Scale subscale (complementary subscale: t=2.41, p<0.05; supplementary subscale: t=2.36, p<0.05) and Critical Thinking scale (t=2.50, p<0.05). Outcomes of the contemporary study indicated that female college student had higher friendship quality and senior students had higher critical thinking, which is consistent with finding of lots of prior research. As higher career congruence between parents and adolescent, we assumed that a divergence model could explain the duration of disagreement might resolve as different inputs and information to summation as time going by. There are theories that a divergence model proposed that youngsters may profit while fathers and mothers vary in their

emotion-related behavior. While parents diverge in their reactions to youngsters' distress, constructive consequences (Tomkins, 1963) might comprise of "a continuing sensitivity to clashes of personalities and to the struggling of communication, and an interest in enhancing communication and working out social conflict".

From results of correlation analyses, critical thinking was positively correlated to the measures of friendship quality subscales significantly. Critical thinking was also positively correlated to the measures of adolescent-parent career congruence subscales significantly. Friendship quality subscales were also positively correlated to measures of adolescent-parent career congruence subscales significantly. There exists a stronger association between critical thinking, friendship quality, and adolescent-parent career congruence. A possible explanation of this phenomenon might be found in the prior research that constructive friendship association have been recognized as another feasible defensive component for adolescents and at-risk children and also lower cohesion and lower adaptability in the family to be significantly related with lower levels of adolescents' self-worth and social competence. When adolescents had low-quality friendships with highly antisocial friends, unilateral parental decision making was specially related with adolescent externalizing behavior (Gauze et al., 1996).

From the consequences of SEM in this research, causal relationships between critical thinking, friendship quality, and adolescent-parent career congruence had good model fit, therefore, friendship quality served as mediator variable for the relationship between critical thinking and career congruence. A possible explanation of this phenomenon might be found in the study that peer relationships may contribute young college students with chance for intimate support, validation, disclosure, and security and recognized as a factor and also circumstance for the maturation of social competence, self-esteem, and academic achievement (Furman & Robbins, 1985; Ladd, 1999). Lansford et al. (2003) also indicated that extraordinary friendship quality and peer group affiliation diminished the association between adolescent externalizing behavior in school and unilateral parental decision making. This might explain higher friendship quality is positively mediated the relationship between adolescent-parent career congruence and critical thinking.

6. Conclusion

Our research reveals that adolescents who possess advanced critical thinking skills tend to exhibit greater career congruence with their parents. However, the impact of critical thinking on career congruence is further enhanced by positive friendship quality. Specifically, our findings indicate that adolescents with high-quality friendships experience a strengthened association between critical thinking abilities and career congruence with parents. This highlights the significance of fostering strong friendships within both family and peer settings when examining the career exploration and alignment with parents among adolescents. The interplay between critical thinking, friendship quality, and parent-child congruence is crucial for understanding the developmental aspects of adolescents' career pathways.

References

Azizi-Fini, I., Hajibagheri, A., &Adib-Hajbaghery, M. (2015). Critical thinking skills in nursing students: A comparison between freshmen and senior students. *Nursing Midwifery Student, 4*(1), e25721. https://doi.org/10.17795/nmsjournal25721

Berndt, T. J. (1996). Exploring the effects of friendship quality on social development. In W. M. Bukowiski, A. F. Newcomb, & W. W. Hartup (Eds.), *The company they keep: Friendship in childhood and Adolescent* (pp. 346-365). Cambridge: Cambridge University Press.

Berndt, T. J. (1996). *Transitions in friendship and friends' influence*. Transitions through Adolescent: Interpersonal domains and context. Mahwah, NJ: Erlbaum.

Berndt, T. J. (1998). Exploring the effects of friendship quality on social development. The company they keep. *Friendships in childhood and adolescence, 13*, 346.

Berndt, T. J. (2002). Friendship quality and social development. *Current Directions in Psychological Science, 11*, 7-10. https://doi.org/10.1111/1467-8721.00157

Berndt, T.J. (2004). Children's friendships: Shifts over a half-century in perspectives on their development and their effects. *Merrill-Palmer Quarterly, 50*, 206-223. https://doi.org/10.1353/mpq.2004.0014

Bigelow, B. J. (1977). Children's friendship expectations: A cognitive-developmental study. *Child Development, 48*(1), 246-253. https://doi.org/10.2307/1128905

Bokhorst, C. L., Sumter, S. R., &Westenberg, P. M. (2010). Social support from parents, friends, classmates, and teachers in children and adolescents aged 9 to 18 years: Who Is perceived as most supportive? *Social

Development, 19, 417-426. https://doi.org/10.1111/j.1467-9507.2009.00540.x

Bowlby, J. (1973). *Attachment and loss: Vol. 2. Separation*. New York, NY: Basic Books.

Bugental, D., & Goodnow, J. (1998). *Socialization processes*. Handbook of child psychology: Social, emotional, and personality development, Vol. 3.

Campbell, A. J., Cumming, S. R., & Hughes, I. (2006). Internet use by the socially fearful: addiction or therapy? *Cyber Psychology and Behavior, 9*, 69-81. https://doi.org/10.1089/cpb.2006.9.69

Capaldi, D. M., Dishion, T. J., Stoolmiller, M., & Yoerger, K. (2001). Aggression toward female partners by at-risk young men: the contribution of male adolescent friendships. *Developmental psychology, 37*(1), 61. https://doi.org/10.1037/0012-1649.37.1.61

Creed, P. A., King, V., Hood, M., & McKenzie, R. (2009). Goal orientation, self-regulation strategies, and job-seeking intensity in unemployed adults. *Journal of Applied Psychology, 94*, 806-813. https://doi.org/10.1037/a0015518

Criss, M. M., Pettit, G. S., Bates, J. E., Dodge, K. A., & Lapp, A. L. (2002). Family adversity, positive peer relationships, and children's externalizing behavior: A longitudinal perspective on risk and resilience. *Child development, 73*(4), 1220-1237. https://doi.org/10.1111/1467-8624.00468

Denham S. A., Mitchell-Copeland, J., Strandberg, K., Auerbach, S., & Blair, K. (1997). Parental contributions to preschoolers' emotional competence: Direct and indirect effects. *Motivation and Emotion, 21*, 65-86. https://doi.org/10.1023/a:1024426431247

Dewey, J. (1910). *How we think*. Buffalo, NY: Prometheus Books. https://doi.org/10.1037/10903-000

Dumitru, D. (2019). Creating meaning. The importance of Arts, Humanities and Culture for critical thinking development. *Student High Education, 44*, 870-879. https://doi.org/10.1080/03075079.2019.1586345

Dunsmore, J. C., & Halberstadt, A. G. (1997). *How does family emotional expressiveness affect children's schemas?* https://doi.org/10.1002/cd.23219977704

Duron, R., Limbach, B., & Waugh, W. (2006). Critical thinking framework for any discipline. *International Journal of teaching and learning in higher education, 17*(2), 160-166.

Dwyer, C. P., Hogan, M. J., & Stewart, I. (2014). An integrated critical thinking framework for the 21st century. *Thinking Skills and Creativity, 12*, 43-52. https://doi.org/10.1016/j.tsc.2013.12.004

Elliot, A. J. (2005). A conceptual history of the achievement goal construct. In A. Elliot, & C. Dweck (Eds.), *Handbook of competence and motivation* (pp. 52-72). New York, NY: Guilford Press.

Ennis, R. H. (1985). A logical basis for measuring critical thinking skills. *Educational leadership, 43*(2), 44-48.

Ennis, R. H. (1987). A taxonomy of critical thinking dispositions and abilities. In J. B. Baron, & R. J. Sternberg (Eds.), *Teaching thinking skills: Theory and practice* (pp. 9-37). Freeman.

Erikson, E. H. (1968). *Identity: Youth and crisis*. New York, NY: Norton.

Facione, P. A. (1990). *Critical thinking: A statement of expert consensus for purposes of educational assessment and instruction*. Millibrae, CA: The California Academic Press.

Facione, P. A., Giancarlo, C. A., Facione, N. C., & Gainen, J. (1995). The disposition toward critical thinking. *The Journal of General Education, 44*(1), 1-25.

Feldman, R. S. (2010). *Child development*. Upper Saddle River, NJ: Pearson Prentice Hall.

Flynn, H. K., Felmlee, D. H., & Conger, R. D. (2017). The social context of adolescent friendships: Parents, peers, and romantic partners. *Youth & Society, 49*(5), 679-705. https://doi.org/10.1177/0044118x14559900

Furman, W. (1996). The measurement of friendship perceptions: Conceptual and methodological issues. In W. M. Bukowski (Ed.), *The company they keep: Friendship in childhood and Adolescent* (pp. 41-65). Cambridge, MA: Cambridge University Press.

Furman, W., & Buhrmester, D. (1992). Age and sex differences in perceptions of networks of personal relationships. *Child Development, 63*, 103-115. https://doi.org/10.1111/j.1467-8624.1992.tb03599.x

Furman, W., & Robbins, P. (1985). What's the point? Issues in the selection of treatment objectives. *Children's peer relations: Issues in assessment and intervention*, 41-54. https://doi.org/10.1007/978-1-4684-6325-5_3

Garcia, P. R., Restubog, S. L., Toledano, L. S., Tolentino, L. R., & Rafferty, A. E. (2012). Differential moderating

effects of student- and parent-rated support in the relationship between learning goal orientation and career decision-making self-efficacy. *Journal of Career Assessment, 20*, 22-33. https://doi.org/10.1177/1069072711417162

Gauze, C., Bukowski, W. M., Aquan‑Assee, J., & Sippola, L. K. (1996). Interactions between family environment and friendship and associations with self-perceived well-being during early adolescence. *Child development, 67*(5), 2201-2216. https://doi.org/10.2307/1131618

Ghabanchi, Z., & Behrooznia, S. (2014). The impact of brainstorming on reading comprehension and critical thinking ability of EFL learners. *Procedia-Social and Behavioral Sciences, 98*, 513-521. https://doi.org/10.1016/j.sbspro.2014.03.447

Gifford-Smith, M. E., & Brownell, C. A. (2003). Childhood peer relationships: Social acceptance, friendships and peer networks. *Journal of School Psychology, 41*, 235-284. https://doi.org/10.1016/s0022-4405(03)00048-7

Hartup, W. W. (1992). Friendships and their developmental significance. In H. McGurk (Ed.), *Childhood social development: Contemporary perspectives* (pp. 175-206). https://doi.org/10.4324/9781315785042-8

Hartup, W. W. (1993). Adolescents and their friends. *New Directions for Child Development, 60*, 3-22. https://doi.org/10.1002/cd.23219936003

Havewala, M., Felton, J. W., & Lejuez, C. W. (2019). Friendship quality moderates the relation between maternal anxiety and trajectories of adolescent internalizing symptoms. *Journal of Psychopathology and Behavioral Assessment, 41*, 495-506. https://doi.org/10.1007/s10862-019-09742-1

Hetherington, E. M. (1978). *Family interaction and the social, emotional and cognitive development of children following divorce*.

Howes, C. (1996). The earliest friendships. *The company they keep: Friendship in childhood and adolescence*, 66-86.

Kaufman, T. M., Kretschmer, T., Huitsing, G., & Veenstra, R. (2020). Caught in a vicious cycle? Explaining bidirectional spillover between parent-child relationships and peer victimization. *Development and Psychopathology, 32*(1), 11-20. https://doi.org/10.1017/S0954579418001360

Khatib, M., Marefat, F., Ahmadi, M., & Tabataba, A. (2012). Enhancing critical thinking abilities in EFL classrooms: Through written and audiotaped dialogue journals. *Humanity & Social Sciences Journal, 7*(1), 33-45.

Kusumoto, Y. (2018). Enhancing critical thinking through active learning. *Language Learning in Higher Education, 8*(1), 45-63. https://doi.org/10.1515/cercles-2018-0003

Ladd, G. W. (1999). Peer relationships and social competence during early and middle childhood. *Annual Review of Psychology, 50*, 333-359. https://doi.org/10.1146/annurev.psych.50.1.333

Lai, E. R. (2011). C*ritical thinking: A literature review. Critical Thinking*, (June), 1-49. Retrieved from http://images.pearsonassessments.com/images/tmrs/CriticalThinkingReviewFINAL.pdf

Lansford, J. E., Criss, M. M., Pettit, G. S., Dodge, K. A., & Bates, J. E. (2003). Friendship quality, peer group affiliation, and peer antisocial behavior as moderators of the link between negative parenting and adolescent externalizing behavior. *Journal of Research on Adolescence, 13*(2), 161-184. https://doi.org/10.1111/1532-7795.1302002

Larson, R., & Richards, M. H. (1991). Daily companionship in late childhood and early adolescence: Changing developmental contexts. *Child development, 62*(2), 284-300. https://doi.org/10.2307/1131003

Liu, F., Chui, H., & Chung, M. C. (2020). The effect of parent–adolescent relationship quality on deviant peer affiliation: The mediating role of self-control and friendship quality. *Journal of Social and Personal Relationships, 37*(10-11), 2714-2736. https://doi.org/10.1177/0265407520937358

Mak, H. W., Fosco, G. M., & Feinberg, M. E. (2018). The role of family for youth friendships: Examining a social anxiety mechanism. *Journal of youth and adolescence, 47*, 306-320. https://doi.org/10.1007/s10964-017-0738-9

Mendelson, M. J., & Aboud, F. E. (1999). Measuring friendship quality in late adolescents and young adults: McGill Friendship Questionnaires. *Canadian Journal of Behavioural Science/Revue canadienne des sciences du comportement, 31*(2), 130-132. https://doi.org/10.1037/h0087080

Moore, T. (2011). Critical thinking and disciplinary thinking: A continuing debate. *Higher Education Research & Development, 30*(3), 261-274. https://doi.org/10.1080/07294360.2010.501328

NACE. (2017). *Job outlook 2018*. Retrieved from http://careerservices.wayne.edu/pdfs/2018-nace-job-outlook-survey.pdf

Parke, R. D., & Buriel, R. (2008). Socialization in the family: Ethnic and ecological perspectives. *Child and adolescent development: An advanced course*, 95-138. https://doi.org/10.1002/9780470147658.chpsy0308

Profetto-McGrath, J. (2003). The relationship of critical thinking skills and critical thinking dispositions of baccalaureate nursing students. *Journal of advanced nursing, 43*(6), 569-577. https://doi.org/10.1046/j.1365-2648.2003.02755.x

Raboteg-Saric, Z., & Sakic, M. (2014). Relations of parenting styles and friendship quality to self-esteem, life satisfaction and happiness in adolescents. *Applied Research in Quality of Life, 9*(3), 749-765. https://doi.org/10.1007/s11482-013-9268-0

Rao, N., Moely, B. E., & Sachs, J. (2000). Motivational beliefs, study strategies, and mathematics attainment in high- and low-achieving Chinese secondary school students. *Contemporary Educational Psychology, 25*, 287-316. https://doi.org/10.1006/ceps.1999.1003

Rubin, K. H., Dwyer, K. M., Booth-LaForce, C., Kim, A. H., Burgess, K. B., & Rose-Krasnor, L. (2004). Attachment, friendship, and psychosocial functioning in early adolescence. *The Journal of early adolescence, 24*(4), 326-356. https://doi.org/10.1177/0272431604268530

Sawitri, D. R., Creed, P. A., & Zimmer-Gembeck, M. J. (2013). The Adolescent-Parent Career Congruence Scale. *Journal of Career Assessment, 21*, 210-226. https://doi.org/10.1177/1069072712466723

Schoon, I., & Parsons, S. (2002). Teenage aspirations for future careers and occupational outcomes. *Journal of Vocational Behavior, 60*, 262-288. https://doi.org/10.1006/jvbe.2001.1867

Searing, L. M., & Kooken, W. C. (2016). The relationship between the California Critical Thinking Disposition Inventory and student learning outcomes in baccalaureate nursing students. *Journal Nursing Education, 55*(4), 224-226. https://doi.org/10.3928/01484834-20160316-08

Sokol, A., Oget, D., Sonntag, M., & Khomenko, N. (2008). The development of inventive thinking skills in the upper secondary Language classroom. *Thinking Skills and Creativity, 3*(1), 34-46. https://doi.org/10.1016/j.tsc.2008.03.001

Stearns, J. A., Godley, J., Veugelers, P. J., Ekwaru, J. P., Bastian, K., Wu, B., & Spence, J. C. (2019). Associations of friendship and children's physical activity during and outside of school: A social network study. *SSM-population health, 7*, 100308. https://doi.org/10.1016/j.ssmph.2018.10.008

Thien, L. M., Razak, N. A., & Jamil, H. (2012). *Friendship Quality Scale: Conceptualization, Development and Validation*. Australian Association for Research in Education (NJ1).

Tomkins, S. (1963). *Affect imagery consciousness: Volume II: The negative affects*. Springer publishing company.

Toplak, M. E., West, R. F., & Stanovich, K. E. (2017). Real-world correlates of performance on heuristics and biases tasks in a community sample: Heuristics and biases tasks and outcomes. *Journal of Behavioral Decision Making, 30*, 541-554. https://doi.org/10.1002/bdm.1973

Vitaro, F., Brendgen, M., & Tremblay, R. E. (2000). Influence of deviant friends on delinquency: Searching for moderator variables. *Journal of Abnormal Child Psychology, 28*, 313-325. https://doi.org/10.1023/A:1005188108461

Waldrip, A. M., Malcolm, K. T., & Jensen-Campbell, L. A. (2008). With a little help from your friends: The importance of high-quality friendships on early adolescent adjustment. *Social Development, 17*(4), 832-852. https://doi.org/10.1111/j.1467-9507.2008.00476.x

Zhang, H., & Lambert, V., (2008). Critical thinking dispositions and learning styles of baccalaureate nursing students from China. *Nursing Health Science, 10*(3), 175-181. https://doi.org/10.1111/j.1442-2018.2008.00393.x

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Data sharing statement

No additional data are available.

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