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The major-interest congruence of Dutch first year students, and the influence of parents and peers

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Abstract

This study is aimed at the major-interest congruence of Dutch first year students, and the influence of parents and peers thereon. The major-interest congruence is calculated with the Dutch translation of the RIASEC questionnaire, called the AIST-R (Bergmann, Eder, 2005), combined with the Holland's Opleidingzoeker (Van Eijk, Uterwijk & Plateel, 2014). Questions about parental and peer influence are constructed and divided into three categories; parental steering, parental encouraging, and peer influence. The participants were 72 first year students. The regression analysis proofed that, in line with the hypothesis, both parental steering and peer influences had a negative impact on the major-interest congruence, but in contrast with the hypothesis, parental encouragement also proved to have a negative impact. Since these results are all insignificant, no conclusions can be made based on these results.

Keywords: major-interest congruence, college major choice, interest profile, parental influence, peer influence.

Introduction

In 2010, 17.2 percent of students at universities of applied sciences in the Netherlands failed their first year. At universities, 8.3 percent of first years failed. After four years 34.4 percent of the students studying at universities of applied sciences attained a bachelor's degree in 2006, and 25.5 percent after three years of university followed by 45.9 percent of students after four years (Inspectie van het onderwijs, 2011). These statistics are dependent on the college major future students make. Different factors such as gender, culture, race, socioeconomic status, parental influence, peer influences, private or public high school, grades, job potential and potential salary can influence college major choice (Porter & Umbach, 2006; Malgwi, Howe & Burnaby, 2005).

Gender is related to college major choice in multiple ways. Research argues that gender differences in major choice are results of socialization in traditional gender roles, and choosing a certain major is related to gender role orientation. In addition, if the college major has a small proportion of women, they will be likely to feel out of place (Lackland, 2001; Umbach & Porter, 2006). In later research, undergraduate students were surveyed in major choice influence and no significant differences were found between male and female students. Both male and female students also noted interest as the main factor on which they based their major choice. Counselling and parental influence were also an equal factor for both males and females. Men found factors such as potential job opportunities, potential job advancement and potential salary more important than women, and they were less influenced by their aptitude on the subject compared to women (Malgwi, Howe & Burnaby, 2005).

Ethnic minorities are less likely to choose a certain major where few minorities are present, and if they do so, attrition is likely (Porter & Umbach, 2006). In the United States Asian students tend to choose science majors more often, black students are more likely to choose interdisciplinary studies, while Hispanics are more likely to choose arts & humanities or social sciences (Dickson, 2010).

Socioeconomic status and educational attainment are closely related to how much parents encourage a student to go to college (Porter & Umbach, 2006). Students from lower SES families tend to be more likely to choose a major in technical-, business-, and life/health fields which generate better job opportunities and higher economic returns (Ma, 2009).

In this study, college major choice will be linked to interest profiles of students and the influence of parents and peers on this choice will be analysed. Interest major congruence was positively related to cumulative GPA, higher rates of satisfaction with their academic program, and students being more likely to graduate in a timely fashion (Allen & Robbins 2010; Tracey & Robbins, 2006). Peers are found to have a big influence on the major choice process (Hallinan & Williams, 1990; Russel, 1980). Furthermore, parents also play an important role according to several researches (Leach & Zepke, 2005; Sgage & Hossler, 1989). Since there are a lot of positive outcomes linked to major-interest congruence, the aim of this study is to try to find out whether there are positive or negative effects when influences of social environment play a bigger role. Since little research about the subject of major-interest congruence , and the influence of parents and peers thereon, has been done in the Netherlands, findings from this study will also prove whether or not this choosing process is the same among Dutch students in comparison with the other countries.

Influence of social environment

The process of choosing a major is influenced by various factors. Leach and Zepke (2005) summarized these factors in a model, and in all stages of the model parental influence is found important. Leach and Zepke claim that parental influence includes parental disposition, preference, expectations, support and encouragement. The dichotomy in these influences show that parental influence can have two effects on the child, the first of which is a supporting effect. This includes parents' support towards the child to explore his or her interest, or providing general information about higher education. The second effect is a more negative effect where parents have a steering influence on the student's choice. Examples of this are parents who are motivating children to take over the family business, motivating them to apply for a college major with high chances of getting a well-paid job, or students who are following their parents' footsteps (Simpson, 2001). Students from lower SES families are more likely to choose a major in technical, business, and life/health fields, which generate better job opportunities and higher economic returns (Ma, 2009). Students with a lower commitment towards studying are often coerced by their

parents into STEM (science, technical, economic or mathematical) studies (Perez, Cromley & Kaplan, 2014). If this is the case, chances of interest major congruence are lower, and in the case of coercion towards a STEM study, it might cause an incongruence between college major choice and interest profile.

Multiple studies have looked at the five factors noted by Leach and Zepke and have tried to find out which are most influential. Cabrera & La Nasa (2000) and Harker, Slader and Harker (2001) reported that parents' encouragement and support is the primary factor in the college choice process. Stage & Hossler (1989) on the other hand, found that parental expectation was the best predictor for students on whether or not they will attend higher education. Students from well-educated families for example, felt obligated to continue into higher education (Holmegaard, 2015). The students in this study explained how their parents implicitly expect them to choose certain prominent higher education programs. On the other hand, the same students from these well-educated families can also use their social network in order to provide them with insider information about studies and career paths. This can be an advantage to help the students base their decision on better information. In contrast, students from families who are less educated did not feel like they had to choose a higher education program. They revealed that they focused on choosing a study leading to a prestigious and high-status career rather than a prominent study program. Payne (2003) reported that parents' role was the most important factor in the college major choice process. This role however, is not always a positive role. Yorke (1999) found a negative consequence of parental involvement, finding that many students went to university as a result of parental pressure and often made wrong college major choices.

In order to find out in what way the parents influenced the college major choice, this study distinguishes two types of influences by parents. The first type is the encouraging influence, and the second is the steering influence (Leach & Zepke, 2005; Simpson, 2001).

Besides the influence of the parents, peers or friends also play a big role in the process of college major choice. A case study performed by Chapman and Johnson (1979) shows that first year college students report the comments and college choices of their friends as the most important influence on their own college decision. A study performed by Russell (1980) surveyed 13.000 high school students, and he reported that the post-secondary aspirations of friends were cited as one of the most influential factors in determining students' postsecondary plans. In a study performed by Hallinan and Williams (1990), the results showed that students are asked about their college plans regularly throughout high school by friends and family. This results the students to be very vulnerable for information provided by friends and family about colleges. Since the students want to give a good response to these questions, they try to form an opinion with the little information they have. In addition, students who are finishing high school are dependent on information to make a decision. Peers, parents and teachers are all easily available for counselling, and good sources for information (Hallinan & Williams, 1990). Chapman and Johnson

(1979) also state that the college that friends attend will become more appealing to students. Moreover the comments those close friends make about certain colleges, shapes the student's expectations about that particular college.

College major-interest congruence

In this study, college major-interest congruence is perceived as the congruence between college major choice and interest profiles. Recent research suggests that an environmental fit between students and their academic environment is critical to successful student outcomes (Porter & Umbach, 2006). With measurement using the Holland types based on the vocational interest of a student, college major choice can be predicted. Interest scores that are in line with a student's choice of major have a positive effect on college performance. In other words, these students had higher GPA's (Tracey & Robbins 2006). Besides higher GPA's, students with college major-interest congruence had higher rates of satisfaction with their academic program, and these students are more likely to graduate in a timely fashion (Schmit, Oswald, Friede Imus, & Merrit, 2008; Allen & Robbins,2010).

This supports the importance of effective educational and career planning. Based on these findings, it is assumed that a higher congruence between interest and college major choice will be beneficial for students in choosing a major.

RIASEC

Holland's theory was used to decide to what degree a student has college major-interest congruence. The primary focus of Holland's theory is to help people select a job based on different vocational interest profiles. Holland's theory refers to vocational choices and how they relate to certain interest profiles that can be found making the RIASEC test (Holland, 1997). Applying Holland's theory, research suggests that students choose an academic environment that is compatible with their own personality type. Subsequently, this academic environment will better suit student's abilities and interests (Smart, Feldman & Ethington, 2000). Using Holland's Zelfonderzoek, the vocational profile resulting from the test can be linked to a list of majors, which are also linked to those different profiles (Van Eijk, Uterwijk & Plateel, 2014). Furthermore, Holland's theory and the RIASEC questionnaire are relevant in Europe, and in this day and age (Bullock, Andrews, Braud & Reardon, 2009).

The RIASEC test can be used to identify or characterize personal profiles that relate to six different interest and work environments. Based on Porter and Umbach (2006) the following definitions can be created: realistic environments put their focus on practical and concrete activities often with use of tools and machines. Disciplines related with realistic environment are mechanical engineering, electrical engineering and military science. Investigative environments put emphasis on the creation and use of

knowledge. Acquiring knowledge is the goal of this environment by using investigation and techniques of problem solving. Disciplines considered to belong to the investigative environment are mathematics, sociology, biology, civil engineering and economics. Social environments focus on teaching and healing. Emphasis is on acquisition of interpersonal competencies.

Disciplines associated are political science, nursing, education, history and philosophy. Enterprising environments have an orientation towards organizational and personal goal attainment through manipulation or leadership. Leadership development is important and they reward popularity, aggressiveness and self-confidence. Disciplines include journalism, business, communications and computer science. Artistic environments put emphasis on creative activity. These environments encourage the acquisition of innovative and creative competencies. Arts, architecture, music and theatre are examples of artistic disciplines.

Holland's theory suggests that students will perform better academically if their major environment is congruent with their interests; it is also suggested that they will finish their degree's sooner (Allen & Robbins 2010).

Problem definition

The main question that will be answered in this article is: what is students' major-interest congruence, and do parents and peers have an influence on this congruence? This study will look at whether the college major choice students have made matches the Holland Code that has been extracted from their questionnaire. Comparable research has been done already, but not in the Netherlands. In addition, little research distinguishes multiple types of influence by parents. Students entering the process of deciding what college major to choose had preconceptions on what they should study based on pressure of their parental and peer group beliefs (Hemsley-Brown, 1999). In this study the supposition is made that if these preconceptions play a bigger role than the interest profile, it will result in a larger chance of major-interest incongruence. Multiple hypotheses are constructed about what the influences of parents and peers may cause in the process of choosing a college major.

Hypothesis 1: a large steering role of parents (pushing the student in a certain direction) on college major choice can result in a lower major-interest congruence.

This hypothesis is supported by the findings of Yorke (1999). Coercion by parents to choose a major based on potential job opportunities and economic returns of a certain type of major also enlarge the chance of major-interest incongruence (Perez, Cromley & Kaplan, 2014; Yang, 2013). Ma (2009) states this is mostly the case in families with lower SES where job opportunity and economic return are considered more important than studying something that fits with someone's personal interests.

Hypothesis 2: a supporting and encouraging role of parents has a positive effect on the major-interest congruence.

Parental coercion can result in major-interest incongruence if students are coerced to choose a major that does not fit their profile (Perez, Cromley & Kaplan, 2014; Yang, 2013). If this is the case, it is interesting to find out what effect support and encouragement have opposed to coercion.

Hypothesis 3: a *big influence of peers on college major choice may result in a lower major-interest congruence.*

Since peer group beliefs and preconceptions play an important role, it can be assumed that if their influence is high and a student feels obliged to give into that pressure, a higher chance of major-interest incongruence will be the result (Hemsley-Brown, 1999).

Method

Participants

The participants are a group of students in first year courses from the University of Utrecht. This is in contrast with the original plan of the study, where the participants would have been high school seniors. The group consists of $n = 72$ (27 male, 45 female), with an age of $M = 20.03$, $SD = 1.74$. The reason for this switch was that at the moment of data collection, the high school seniors no longer had classes, only preparations for the final exams that were about to take place in the near future, and therefore were unapproachable for this study. The switch to students in first year courses was made since they are closest in time to the choice process itself.

Instruments

The questionnaire, as seen in Appendix A, that was be used to collect the data from the students consists of multiple components, the first being the RIASEC questionnaire. The Dutch translation, called the AIST-R (Bergmann, Eder, 2005) is a revised version of the original AIST (1992, 1999), which is a test based on the model of Holland. The questionnaire consists of 60 activities. Participants had to indicate to what extend they are interested in doing these activities on a 5-point Likert scale. The questions successively represent the different personality types; realistic, investigative, artistic etc. For every personality type there are ten questions. Based on the ten questions, which can range from one to five, a conclusive score of 10-50 can be calculated of each of the six types. The three highest scores together form the final code extracted from the RIASEC questionnaire. For instance when a student has the following scores on the RIASEC questionnaire; R:27, I:38, A:17, S:40, E:28, C:24, his code will be SIE.

Bergmann and Eder (2005) found internal consistency between $\alpha = .82$ and $\alpha = .87$; the stability coefficient with a sample of $n = 2.496$ with ages varying between 14 and 28. Good discrimination between factors were found of the different interest profiles. Examples of the RIASEC questions can be found in Table 1.

Although the original plan was to have high school seniors take part in this study, the RIASEC questionnaire is still usable for the target group, since the questionnaire is not designed for a specific population.

In addition to the RIASEC questionnaire, questions about the influence of parents and peers will also be included. The questions consist of statements with a 5-point Likert scale rating attached to every statement. Since most previous research about influence of parents on college major choice did not distinguish different types of influence, this study will distinguish two categories. The first category consists of questions that prove a steering influence when students agree with the question. The second category proves an encouraging influence when agreed with the question. The different categories are mixed up in the questionnaire; all the odd numbered questions are related to the first category, and all the even numbered ones related to the second category. The questions about steering parental influences are based on literature that states that parents make plans about their child's future, and then try to steer it in that direction (Ceja, 2006; Flint, 1992; Cabrera & La Nasa, 2000). These plans, for instance, can include a minimal salary their children should earn, the prestige that goes along with the profession, or parental desire that their children will follow in their footsteps and take over the family business. The questions that were formulated in the questionnaire all add up to parents having influence on the direction of college major the student chose. The other questions related to parental influence prove that parents can support the child in the process of choosing a major. Parental advice about how to gain information about different majors, for instance, is a way in which parents can support their children in a positive way. Parents can initiate a child's thinking process, motivate it to look into majors that matches his or her interest, and point out the child's qualities and talents (Cabrera & La Nasa, 2000; Brooks, 2003; Holmegaard, 2015).

The theory on which the questions about peer influences are based, found that peers are mainly used as a source of information, or seen as a role model (Hallinan & Williams, 1990). Students have to make a big life decision, which their peers have to make as well. Subsequently, all information peers gather is also relevant to the student itself. Moreover, peers can express their opinion about options the student considers, which can be taken into consideration while making the final decision (Brooks, 2003; Chapman, & Johnson, 1979). Finally, peers can also influence the choice process by the choices they make, since many friends like to stay close to one another (Chapman, & Johnson, 1979). Examples on both parental- and peer influence questions can be found in Table 2.

Two final components are added to the questionnaire to complete it. The first one is the informed consent. This is an agreement that states that the student is well informed prior to participating in the study, and has every right to discontinue whenever he or she desires. It also states that the information will be handled with care, and will not be used for any other purpose than this study. The final question that is added to the questionnaire is: *What major did you choose (college major and educational institution)?* This question is needed in order to link the interests to the college major choice.

Another instrument that is used in this study is Holland's Zelfonderzoek (Van Eijk et al., 2014). This is the official Dutch translation of the Self-Directed Search of Holland (1994), which is a self-testing method of interests, and contains a list of all possible college major choices in The Netherlands with their corresponding RIASEC codes. This is used to look up the RIASEC code corresponding with the college major choice made by the student.

Pilot test

In order to test the self-constructed items on the questionnaire, a small pilot test has been conducted to find out if all questions were clear, and whether no misconceptions would arise among the participants. 10 adolescents, aged between 19 and 23, were asked to complete the entire test. Feedback that was retrieved from this pilot was subsequently implemented in the questionnaire.

Table 1

Examples of items on RIASEC questionnaire

Proven personality type	Example item
Realistic	Working with machines or technical equipment
Investigative	Performing an experiment in a laboratory
Artistic	Writing stories or reports
Social	Guiding or educating someone else
Enterprising	Leading a team
Conventional	Writing a formal letter

Table 2

Examples of items on social influence

Social influence	Example item
Steering parental influence	My parents/guardians have expressed doubts about college majors I suggested
Encouraging parental influence	My parents/guardians pointed me at my talents and qualities during my college major choice process
Peer influence	Together with a friend, I looked at college majors that would interest us both

After all data was collected a factor analysis was performed, both on the RIASEC questionnaire as well as on the questions about peer- and parental influences. The Cronbach's Alpha of the RIASEC questionnaire was $\alpha = .860$, which is in line with the findings of Bergmann and Eder (2005) on the test. A confirmatory factor analysis was performed to check the validity of the six factors of the RIASEC model, and has an explained variance was 54.07%, which is good according to the COTAN criteria (Evers, Sijtsma, Lucassen & Meijer, 2010).

For the questions about social influences an exploratory factor analysis was conducted. Based on the scree-plot, four factors were found. Since this is more than previously intended three factors, some questions were removed. After looking at the component matrix, questions that didn't score high on the first three factors were looked into. These questions, question 1 and 14 for parental influence and question 1, 3 and 4 for peer influence, were multi interpretable and therefore removed.

After this another exploratory factor analysis was conducted and looking at the scree-plot three factors were found with an explained variance of 48.71%. This is sufficient according to COTAN criteria (Evers, Sijtsma, Lucassen & Meijer, 2010).

With the above mentioned items removed, the test on social influence had reliability of $\alpha = .749$. The factors separately had a reliability of: parental encouragement .783, parental steering .846 and peer influences .682. These factors were reliable enough to continue the analysis.

Design and procedure

The participants that took part in this study were mainly asked to fill in the questionnaire at the end of lectures or workgroups, in a physical form. In addition, the online questionnaire with a link and a complementary text was posted in multiple Blackboard communities of first year subjects, but those gave little results. The questionnaire itself (appendix A) is in Dutch, and the results were exported to Excel as

soon as they were collected. There multiple variables were calculated, for instance peer influence and major-interest congruence. Subsequently the results were exported to SPSS to be further analysed.

No individual results were reported back to the students, since the information about whether or not their college major choice is in line with their interest might discourage them to pursue that major. The final findings, however, will be reported back to the students that took part in the study and indicated to be interested in the results. For this purpose an optional question was included in the questionnaire to fill in the students e-mail address.

As for the last question of the questionnaire, students were asked to fill in the first major choice they made, immediately after finishing high school, since the parental and peer influences led to that specific choice.

Analysis

The first step after finishing the questionnaire is to determine to what extent the major-interest congruence exists between college major choice and interest profile. The dependent variable is to what extent a student has a major-interest congruence. The independent variables are the influence of parents and the influence of peers. These variables will be used to conduct regression tests.

Major-interest congruence is determined in the following way: there will be two RIASEC codes, the first of which will be extracted from the questionnaire, and the second of which will be of the chosen college major. This code will be determined using Holland's Zelfonderzoek (Van Eijk et al., 2014), in which all college major choices are listed with the corresponding RIASEC codes. The extent of major-interest congruence will be expressed in a value ranging from 0 to 14. This is because for the first, second and third letter of the code extracted from the questionnaire will respectively make a factor of 3, 2 and 1. These factors will be applied to the scores of the college major code. These scores are three, two and one, also respectively the first, second and third letter of the code. The calculation starts with the first letter of the code extracted from the questionnaire. If this letter is also present in the college major code, the amount of points of its position in the college major choice code is multiplied by 3, since this is the calculation of the first letter. The second letter is calculated in the exact same way, but will be multiplied by 2, and for the third and final letter of the questionnaire code, the factor will be 1. In case of identical codes, the score will be 14 (3*3 + 2*2 + 1*1). To explain this method further, table 3 will be an example of a student that had RIS as his code, extracted from the questionnaire.

Table 3

RIASEC codes calculated in major-interest congruence examples

Questionnaire code	College major	College major code	Calculation	Major-interest congruence (0-14)
RIS	Security Technology	RCO	3*3 + 2*0 + 1*0	9
RIS	Chemistry	CRI	3*2 + 2*1 + 1*0	8
RIS	Life sciences	IRC	3*2 + 2*3 + 1*0	12

The best major-interest congruence for this hypothetical student would be Life Sciences, with a score of 12 out of 14.

The three independent variables, parental encouragement, parental steering and peer influence, are scored in a similar way. For every variable there were nine questions in the original questionnaire, with a 5-point Likert scale. These five points, ranging from totally disagree to totally agree, have points assigned to them. The first option, totally disagree, will be assigned one point, and the last one, totally agree, five points. Ultimately, this would have resulted in a score ranging from 9 to 45, where a score of 27 would have meant that the influence of this factor was neutral. Since one question was removed on both parental factors, the new scores for these factors range from 8 to 40. A score of 24 would mean a neutral influence on these factors. As for the peer influence factor, the six remaining questions will result in scores ranging from 6 to 30, with 18 meaning a neutral influence. Table 4 will contain a complete overview of these factors and their values. With the scores on these factors, the influence of the different variables will be able to be compared to the major-interest congruence.

Since there are three different hypotheses, multiple tests will be conducted, all of which are regression tests. These 2-tailed Pearson correlation tests' dependent variable is the major-interest congruence in every one of them. The independent variables are respectively parental encouragement, parental steering and steering by peers. These correlations give an insight in whether or not the independent variables have an impact on the dependent variable.

Results

After analysing the collected data a major-interest congruence of $M = 8.36$, $SD = 3.00$ was found for the entire sample, which means that on average there was a high congruence. Further descriptive statistics of the variables can be seen in table 4.

Table 4

Descriptive statistics of the variables

Variable	*M*	*SD*	Range	Neutral influence	Minimum	Maximum
Amount of major-interest congruence	8.36	3.00	0 - 14		0	14
Parental steering influence	20.10	6.14	8 - 40	24	10	37
Parental encouraging influence	29.11	5.18	8 - 40	24	16	37
Peer influence	15.93	4.23	6 - 30	18	6	24

Hypothesis 1: a large steering role of parents (pushing the student in a certain direction) on college major choice can result in a lower major-interest congruence.

This hypothesis is not supported, since the correlation found, indicates a small negative influence of parental steering influence on major-interest congruence, but is not significant $r = -.181$, $n = 72$, $p = .129$. Since the result is not significant, these findings do not prove the negative effect of parental steering on major-interest congruence. The descriptive statistics of the parental steering influence variable are displayed in table 4. The factor analysis of the parental steering questions showed that all items, except for one, could be grouped under one factor. This question, number 1, has therefore been excluded from the analysis.

Hypothesis 2: a supporting and encouraging role of parents has a positive effect on the major-interest congruence.

In contrast with the hypothesis, the results of the correlation analysis shows that there is a small negative correlation between parental encouragement and major-interest congruence $r = -.147$, $n = 72$, $p = .216$. This analysis proved to be not significant as well, so these findings neither prove there to be a negative nor positive effect of encouraging parental influence on major-college congruence. The descriptive statistics of the parental encouraging influence variable are displayed in table 4. The factor analysis of the parental encouragement questions, showed that question number 14 is not in line with the other questions, and had to be removed in the analysis.

Hypothesis 3: a big influence of peers on college major choice may result in a lower major-interest congruence.

The analysis of the final hypothesis found, in line with the hypothesis itself, a small negative correlation between influence of peers and major-interest congruence r = -.100, n = 72, p = .404. This correlation is not significant, so no conclusions can be made from these results. The descriptive statistics of the peer influence variable are displayed in table 4. Within the peer influence factor, three of the nine questions that were constructed were proven to be unrelated to the factor. These questions were question 1, 3 and 4, and were subsequently excluded from the analysis.

Discussion

This study examined the influence of parents and peers on major-interest congruence. The results showed that none of the three influences had a significant impact.

First of all, the factor analysis of parental steering influence, that showed that question 1 was not related to the factor. The reason why this question, *The college major of (one of my) parents/guardians is in line with mine,* probably did not prove a steering influence is because when the statement is not agreed with, it doesn't prove that the opposite of a steering influence is true. Since this is the case with the rest of the questions, this question cannot be compared with the other questions of the parental steering category.

Secondly, the parental encouragement factor, contained a question that was decided to be excluded in the final analysis. The question, number 14, was the following; *My parents/guardians gave me the liberty to choose for every college major I would like.* In contrast with the intended goal of the question, the factor analysis assigned this question to the parental steering influence category. The reason for this might be that, when not agreed with this question, it proves that the students' parents/guardians did not gave him/her the liberty to choose whatever they want, and thus had a big influence on what could be chosen. This proves a steering influence of parents, therefore it was decided to not include this question in the final analysis. The regression analysis of the parental encouragement factor proved, despite being insignificant, to be a negative influence on major-interest congruence. The reason for this might be that parental influence, regardless in what way, always has a negative influence on major-interest congruence. Further research would have to prove if this is the case, since the results of this study were insignificant. Another explanation for the negative influence of parental encouragement is that the questions, despite all proving the same factor as resulted from the factor analysis, do not prove parental encouragement but a different factor, such as a different sort of parental steering influence.

The factor analysis of the third factor proofed that question 1, 3 and 4 were unrelated to the factor. The questions were the following;

Question 1: *I let the chances of finding a job with my college major weigh heavily, since I don't want to become less successful than my friends.* This question might prove more of an internal desire to become successful than an influence of peers.

Question 3: *Lots of my friends chose (or are about to choose) for the college major I want to pursue.* And question 4: *I have chosen the town where I'm going to be studying, since my friends will also studying there.* These two questions might not prove an influence of peers, but instead prove that the student has more friends than the students who disagreed with these statements.

General limitations and suggestions for further research

This study has some limitations that might have resulted in this study having no clear results.

The first important limitation is that some college majors were mentioned multiple times in Holland's Zelfonderzoek (Van Eijk et al., 2014), along with multiple RIASEC codes. As stated on page 27 of Holland's Zelfonderzoek, the reason for this is that some majors have multiple study paths one can follow, which can result in different skillsets. For instance medical science is stated with six different codes, since someone who wants to become a surgeon will have a different interest profile that someone who wants to become a psychiatrist. Since these different codes aren't explained, the code that formed the largest congruence was used in this study. The decision to take the largest fit instead of the average fit of all the codes, was made based on the fact that the intention for a student to choose a certain major is not known, so it should be assumed that the intentions are the best possible. This entails that students who chose a major that was stated multiple times automatically had a higher than average congruence. If there is a possibility to further differentiate between the different codes that are connected to a major, the fit can be calculated more precisely.

The second limitation is very similar to the first one, namely that when a student's interest profile turned out to be for instance; R:43 A:36 C:36, both RAC as well as RCA could be concluded as the final code. The choice between which one was used was based on the largest congruence, similar to the first limitation. This again resulted in an overall higher than average major-interest congruence. Especially the participants who had both multiple codes based on the interest profile as well as multiple codes based on their major had an average score of 10.0, which in comparison with the average overall congruence score in this study of 8.36, is a large difference. In future research, the average congruence score might give a more realistic view.

The third limitation of this study is that the entire study was constructed with high school seniors in mind. When the switch to students was made, the decision was made to use the already constructed and

approved questionnaire because none of the questions in the questionnaire were specifically made for high school seniors. However, the students filled in their RIASEC questions with their current interests in mind. As stated by Robins, Fraley, Roberts and Trzesniewski (2001) in their longitudinal study on personality change in young adulthood, during the college years these interests change much. This means that the original interest profile the student had when choosing the major might have been a lot different to the interest profile extracted from the RIASEC questionnaire at the end of their first college year. In order to answer the hypothesis of this study more accurately, further research should use high school seniors as their target group.

If students are again used as participants in further research, more questions could be added. For instance GPA, amount of study credits gained (it should be taken into account how long the student took to get these credits), and whether or not this is the first major the student started should be taken into consideration. In addition, other majors the student took into consideration during his choice making process could be inquired. The amount of congruence with these majors, and the difference between that amount of congruence and the congruence with the major that was chosen, might be interesting to compare to the amount of influence parents and peers had. If the fit with a major the student considered for instance was higher than the congruence of his final choice, and the parental influence was high, it may prove that the students' parents pushed the student in a certain direction.

References

Bergmann, C., & Eder, F. (2005). *AIST-R: allgemeiner Interessen-Struktur-Test mit Umwelt Struktur-Test (UST-R); Revision; Manual*. Beltz Test.

Brooks, R. (2003). Young people's higher education choices: the role of family and friends. *British Journal of Sociology of Education, 24*(3), 283-297. doi: 10.1080/01425690301896

Bullock, E. E., Andrews, L., Braud, J., & Reardon, R. C. (2009). Holland's theory in an international context: Applicability of RIASEC structure and assessments. *Career Planning and Adult Development Journal, 25*(4), 29-58. doi: 10.1080/09515070.2015.1053432

Cabrera, A. & La Nasa, S. (2000). Understanding the college-choice process. In A. Cabrera & S. La Nasa. *Understanding the college choice of disadvantaged students*. New Directions for Institutional Research, 107, Fall 2000. Jossey Bass Publishers, 5-22. doi: 110.1002/ir.10701

Chapman, D. W., & Johnson, R. H. (1979). Influences on students' college choice: A case study. *Ann Arbor, MI: Project CHOICE, School of Education, University of Michigan.*

Chapman, D. W. (1981). A model of student college choice. *The Journal of Higher Education, 490-505.* doi: 10.2307/1981837

Ceja, M. (2006). Understanding the role of parents and siblings as information sources in the college choice process of Chicana students. *Journal of College Student Development, 47*(1), 87-104.

Dickson, L. (2010). Race and gender differences in college major choice. *The Annals of the American Academy of Political and Social Science*,*627*(1), 108-124.

Eijk, P. van, Uterwijk, J., & Platteel, I. (2014). *Hollands Zelfonderzoek (HZO)* (2e ed.). Amsterdam, Nederland: HOGREFE.

Evers, A., Sijtsma, K., Lucassen, W., & Meijer, R. R. (2010). The Dutch review process for evaluating the quality of psychological tests: History, procedure, and results. *International Journal of Testing*, *10*(4), 295-317. doi: 10.1080/15305058.2010.518325

Fletcher, J. M. (2008). Peer Influences on College Choices: New Evidence from Texas. doi: 10.1177/003804070908200401

Flint, T. A. (1992). Parental and planning influences on the formation of student college choice sets. *Research in Higher Education*, *33*(6), 689-708. doi: 10.1007/BF00979600

Frehill, L. M. (1997). Education and occupational sex segregation: The decision to major in engineering *The Sociological Quarterly*, *38*(2), 225-249. doi: 10.1111/j.1533-8525.1997

Hallinan, M. T., & Williams, R. A. (1990). Students' characteristics and the peer-influence process. *Sociology of education*, 122-132. doi: 10.2307/2112858

Harker, D., Slade, P. & Harker, M. (2001). Exploring the decision process of 'school leavers' and 'mature students' in university choice. *Journal of Marketing for Higher Education*, 11 (2) 1-20. doi: 10.1300/J050v11n02_01

Hemsley-Brown, J. (1999). College choice perceptions and priorities. *Educational Management & Administration*, *27*(1), 85-98.

Holland, J. L. (1994). *Self Directed Search: a Guide to Educational and Vocational Planning*. Consulting Psychologists Press. doi: 10.1037/0022-0167.23.2.112

Holland, J. L. (1997). *Making vocational choices: A theory of vocational personalities and work environments*. Psychological Assessment Resources. doi: 10.1037/0003066X.51.10.1025

Holmegaard, H. T. (2015). Performing a Choice-Narrative: A qualitative study of the patterns in STEM students' higher education choices. *International Journal of Science Education*, *37*(9), 1454-1477. doi: 10.1080/09500693.2015.1042940

Inspectie van het Onderwijs (2011). *De staat van het onderwijs. Onderwijsverslag 2009/2010* Utrecht, The Netherlands: Inspectorate of Education

Lackland, A. C. (2001). Students' choices of college majors that are gender traditional and nontraditional. *Journal of College Student Development* 42 (1): 39-47. doi: 10.1007/s11162-005-9002-3

Leach, L., & Zepke, N. (2005). Student decision-making by prospective tertiary students. *A review of existing New Zealand and overseas literature. Report to the Ministry of Education. New Zealand*.

Ma, Y. (2009). Family socioeconomic status, parental involvement, and college major choices Gender, race/ethnic, and nativity patterns. *Sociological Perspectives*, *52*(2), 211-234. doi: 10.1525/sop.2009.52.2.211

Malgwi, C. A., Howe, M. A., & Burnaby, P. A. (2005). Influences on students' choice of college major. *Journal of Education for Business*, *80*(5), 275-282. doi: 10.3200/JOEB.80.5.275-282.

Payne, J. (2003). *Choice at the end of compulsory schooling: A research review*. Department for Education and Skills, Research Report No 414.

Perez, T., Cromley, J. G., & Kaplan, A. (2014). The role of identity development, values, and costs in college STEM retention. *Journal of Educational Psychology*, *106*(1), 315. doi: 10.1037/a003402

Porter, S. R., & Umbach, P. D. (2006). College major choice: An analysis of person environment fit. *Research in Higher Education*, *47*(4), 429-449. doi: 10.1007/sl 1162-005-9002-3

Robins, R. W., Fraley, R. C., Roberts, B. W., & Trzesniewski, K. H. (2001). A longitudinal study of personality change in young adulthood. *Journal of personality*, *69*(4), 617-640.

Russell, C. N. (1980). 1980 Survey of Grade 12 Students Post-Secondary Plans and Aspirations.

Schmitt, N., Oswald, F. L., Friede, A., Imus, A., & Merritt, S. (2008). Perceived fit with an academic environment: Attitudinal and behavioral outcomes. *Journal of Vocational Behavior*, *72*(3), 317-335. doi: 10.1016/j.jvb.2007.10.007

Simpson, J. C. (2001). Segregated differences by subject: Racial differences in the factors influencing academic major between european americans, asian americans, and african, hispanic, and native americans. *Journal of Higher Education,* 72(1): 63–100. doi: 0.2307/2649134

Smart, J. C., Feldman, K. A., and Ethington, C. A. (2000). Academic Disciplines: Holland's Theory and the Study of College Students and Faculty, Vanderbilt University Press, Nashville, TN. doi: 10.1353/jhe.2005.0017

Stage, F. & Hossler, D. (1989). Differences in family influences on college attendance plans for male and female ninth graders. *Research in Higher Education*, 30 (3), 301-315.

Tracey, T. J., & Robbins, S. B. (2006). The interest–major congruence and college success relation: A longitudinal study. *Journal of Vocational Behavior*, *69*(1), 64-89. doi: 10.1016/j.jvb.2005.11.003

Wessel, J. L., Ryan, A. M., & Oswald, F. L. (2008). The relationship between objective and perceived fit with academic major, adaptability, and major-related outcomes. *Journal of Vocational Behavior*, *72*(3), 363-376. doi: 10.1016/j.jvb.2007.11.003

Yang, H. (2013). A New Model of International Students' Educational Decision-Making: the Case of Chinese Students' Choices of Major in Accounting in Australia. In *International Academic Workshop on Social Science (IAW-SC-13)*. Atlantis Press

Yorke, M. (1999). *Leaving early: Undergraduate non-completion in higher education.* London: Falmer Press. doi: 10.4324/9780203209479

Appendix A: questionnaire

Universiteit Utrecht

Beste scholier,
Allereerst hartelijk dank voor je deelname. Onderstaande vragen gaan over jouw interesses en de invloed die ouders en vrienden/leeftijdsgenoten (peers) op het proces van studiekeuze hebben gehad. De antwoorden die je hier geeft blijven anoniem en worden alléén gebruikt voor dit specifieke onderzoek.

- Ik verklaar op een voor mij duidelijke wijze te zijn ingelicht over de aard, methode en het doel van het onderzoek. Ik weet dat de gegevens en resultaten van het onderzoek alleen anoniem en vertrouwelijk aan derden bekend gemaakt zullen worden. Mijn vragen zijn naar tevredenheid beantwoord. Ik stem geheel vrijwillig in met deelname aan dit onderzoek. Ik behoud me daarbij het recht voor om op elk moment zonder opgaaf van redenen mijn deelname aan dit onderzoek te beëindigen.

Leeftijd in jaren: _____

Sekse: Man / Vrouw

Email adres * _____

* Optioneel, hiermee zullen wij de resultaten terugkoppelen aan het einde van het onderzoek als u daarin geïnteresseerd bent.

Deze vragenlijst bestaat uit een lijst van verschillende activiteiten. Geef bij iedere activiteit aan in hoeverre deze je interesseert of zou kunnen interesseren.

Nr.	Activiteit	Helemaal niet	Weinig	Een beetje	Best wel	Heel erg
1	Met machines of technische apparatuur werken					
2	In een laboratorium experimenten uitvoeren					
3	Iets creatiefs doen					
4	Andere personen begeleiden of verplegen					
5	Leiding geven aan een team					
6	Boekhouding (financiële administratie) doen					
7	Onderzoeken hoe iets werkt					
8	Wetenschappelijk artikelen lezen					
9	Verhalen of verslagen schrijven					
10	Iemand begeleiden/onderwijzen					
11	Een bedrijf of onderneming leiden					
12	Met een schrijfprogramma (bijv.: Word) werken					
13	Metaal/hout bewerken of iets maken van metaal/hout					
14	Met vernieuwende dingen bezig zijn					
15	Gedichten en literatuur lezen en duiden					
16	Andere mensen adviseren					
17	Een discussie leiden					
18	Zakelijke brieven schrijven					
19	Fysiek (lichamelijk) werk doen					
20	Iets nauwkeurig bekijken en analyseren					
21	Dingen doen waar creativiteit/fantasie voor nodig is					
22	Luisteren naar andermans problemen					
23	Ergens reclame voor maken					
24	Een taak doen waarvoor je heel precies en hard moet werken					
25	Nieuwe computer onderdelen installeren					
26	Het gedrag van dieren of planten onderzoeken					
27	Zich met oude culturen bezighouden					
28	Mensen bedienen of voor mensen zorgen					
29	Een evenement organiseren					
30	Prijsvoorstellen opvragen en vergelijken					
31	Technische ontwerpen tekenen					
32	Lange tijd aan de oplossing van een probleem werken					
33	Dingen mooi maken (bijv.: versieren)					
34	Zich inzetten voor de belangen van anderen					
35	Toezicht houden op of controleren van anderen					
36	Een databestand maken en data verwerken					

37	Bouwen van elektrische apparatuur of elektriciteit aanleggen					
38	Chemische, fysische of biologische proeven doen					
39	Een vreemde taal leren					
40	Netwerken, met mensen in contact komen					
41	Zich in het openbaar inzetten voor een bepaalde zaak					
42	Ergens aantekeningen of een lijstje van maken					
43	Op een bouwplaats werken					
44	Een computerprogramma ontwikkelen					
45	Spelen in een toneel- of muziekgroep					
46	Zorgen voor hulpbehoevende kinderen of volwassenen					
47	Anderen ergens van overtuigen of voor motiveren					
48	Dingen verzamelen, ordenen of beheren					
49	Diensten verlenen (reinigen, onderhouden, repareren)					
50	De oorzaak van een probleem verkennen					
51	Schilderen of tekenen					
52	Zieken of gewonden verzorgen					
53	Met mensen onderhandelen					
54	Toezien op het naleven van regels					
55	Iets maken volgens een tekening of plan					
56	Uitzoeken wat een computerprogramma allemaal kan					
57	Iets creatiefs met taal doen					
58	Zich inleven in de situatie van anderen					
59	Het woord nemen in een groep					
60	Een rekening controleren					

Om de invloed te bepalen van jouw ouders/verzorgers op jouw studiekeuzeproces is er een aantal stellingen opgesteld. Geef bij deze stellingen aan in welke mate jij het er mee eens bent.

Nr.	Stelling	Zeer mee oneens	Mee oneens	Neutraal	Mee eens	Zeer mee eens
1	De studierichting van (één van) mijn ouders/verzorgers ligt in lijn met de mijne					
2	Mijn ouders/verzorgers motiveerden mij na te denken over wat ik wilde studeren					
3	Mijn ouders/verzorgers wilden dat ik een studie ga doen met een hoge banenkans					
4	Mijn ouders/verzorgers boden mij informatie aan over verschillende studies					
5	Mijn ouders/verzorgers verwachtten dat ik een vervolgstudie zou kiezen					
6	Mijn ouders/verzorgers deelden hun eigen ervaringen over hun studie/hoger onderwijs					
7	Mijn ouders/verzorgers hadden al een beeld over mijn toekomst zonder dat hier over had nagedacht (of met hen had gedeeld)					
8	Mijn ouders/verzorgers spoorden mij aan om naar open dagen te gaan					
9	Mijn ouders/verzorgers wilden dat ik een studie ging doen waar ik veel geld mee kan verdienen					
10	Mijn ouders/verzorgers gingen met mij mee naar open dagen					
11	Mijn ouders/verzorgers hebben hun twijfels uitgesproken over studies die ik suggereerde te willen volgen					
12	De studie suggesties die mijn ouders/verzorgers maakten waren gebaseerd op mijn interesses					
13	Mijn ouders/verzorgers hebben mij ontmoedigd om voor een bepaalde studie, die mij interessant leek, te kiezen					
14	Mijn ouders/verzorgers gaven mij de vrijheid voor elke studie te kiezen die ik maar wilde					
15	De mening van mijn ouders/verzorgers over de studie is voor mij van grote invloed geweest op de studiekeuze					
16	Mijn ouders/verzorgers hebben (met mij) naar antwoorden gezocht op vragen waar ik in mijn studiekeuze proces tegenaan liep					
17	Mijn ouders/verzorgers wilden dat ik een studie ging doen, waarmee ik later een baan met veel aanzien kon krijgen					
18	Mijn ouders/verzorgers hebben mij gewezen op mijn talenten en kwaliteiten tijdens mijn studiekeuze proces					

Om de invloed te bepalen van jouw vrienden/leeftijdsgenoten (peers) op jouw studiekeuzeproces is er een aantal stellingen opgesteld. Geef bij deze stellingen aan in welke mate jij het er mee eens bent.

Nr.	Stelling	Zeer mee oneens	Mee oneens	Neutraal	Mee eens	Zeer mee eens
1	Ik heb mijn banenkans van mijn studie zwaar laten meewegen, omdat ik niet minder succesvol wil worden dan mijn vrienden					
2	Ik heb samen met mijn vrienden gekeken naar studies die ons allebei zouden interesseren					
3	Op de studie die ik wil gaan volgen, zitten veel vrienden van mij (of gaan volgend jaar veel vrienden van mij ook beginnen)					
4	De stad waar ik ga studeren heb ik gekozen omdat mijn vrienden daar ook gaan studeren					
5	Mijn vrienden hebben hun eigen mening/ervaringen gedeeld over studies die ik overwoog te doen					
6	Mijn vrienden hebben hun twijfels uitgesproken over studies die ik voorstelde te willen volgen					
7	Mijn vrienden hebben mij aangezet tot het oriënteren op studies					
8	Mijn vrienden hebben mij informatie gegeven over studies, waar ik mijn studiekeuze op heb gebaseerd					
9	Mijn vrienden hebben mij gewezen op mijn talenten en kwaliteiten tijdens mijn studiekeuze proces					

Welke studiekeuze heb je gemaakt? (Onderwijsinstelling en studierichting)

_____