

# The Influence of Parents' Profession and Education on the Innovativeness of their Children

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## ABSTRACT

**Purpose** – The purpose of this paper is to identify additional influences on innovativeness. In this case if the profession and education of parents has an effect on their children's innovativeness, particularly on exploration and exploitation.

**Design and Methodology** – A survey with 99 people with different backgrounds was conducted. The requirement on the respondents were that they are all older than 30 years, have an academic degree and work experience. The data collected on the parents' profession and education was also sufficient to run the analysis. For the main analyses two multivariate ANCOVAs were used.

**Findings** – There was no significant relationship between parents' profession/education and their children's innovativeness neither on exploration nor on exploitation. Disregarding that the overall model was not significant a trend was found that tenure has a negative effect on exploration, which is in line with the existing literature. Under the consideration that the model was not overall significant a found tendency for an interaction effect between the education of the father and the mother was further analyzed. A positive influence on exploitation was found when both parents have an academic education.

**Originality/value** – The novelty of this study lies in the exploration of the relationship between the profession and education of parents and their children's innovativeness. Even there was no significant relationship to be found, there were an indication for a relationship between a high education of both parents and their children's innovativeness. But to further conclude additional research needs to be done.

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## Keywords

Innovativeness, individuals, parents, profession, education, academic degree

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# 1. INTRODUCTION

Innovativeness has been recognized as a driving factor for company's sustainable growth and cost efficiency. Therefore, it became an increasingly relevant topic in today's competitive environment. (Duysters, De Hoyos & Kaminishi, 2012)

The term innovativeness is a broad concept with different meanings, where innovation and innovativeness are often used interchangeably, but there is a main difference between the definitions. This difference is that innovation is regarded as the "number of successful innovations implemented and innovativeness refers as an organization's overall capability of introducing new products to the market, or opening up new markets, through combining strategic orientation with innovative behavior and process" (Duysters et. al., 2012, p.433).

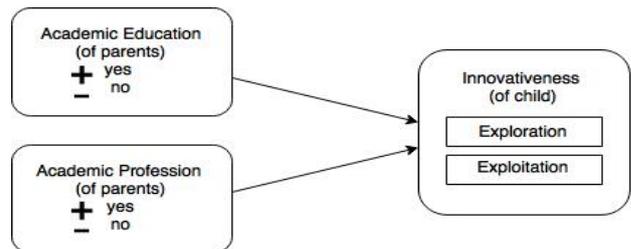
The importance of innovation will increase, especially considering the future, where the complexity of products will rise tremendously and where competition will be even stronger. Innovation is crucial for a company's survival and growth (Baumol, 2002). This is built upon the fact that being innovative is necessary for companies to defend their market position as well as to create a competitive advantage (McGrath et al., 1996). This can be done for example by inventing a novel product to attract customers or further develop an existing feature to make the product more attractive and to keep customers. Therefore, companies are always seeking and are in need for innovative ideas and innovative people. Hence, it is very important for companies to know what influences innovative behavior of individuals and which personal background of their possible future employees might have a positive effect on innovativeness. Innovative behavior has been researched numerous times and multiple factors have been identified to influence innovativeness as for example: age, tenure, expertise and intrinsic motivation (Duysters et al., 2012). In this paper an attempted is going to be made to measure if there is a relation between parents' profession and education and their children's innovativeness later in their lives.

The fact, that parents have a big influence on their children is not arguable. The literature has shown that children's achievement are influenced by parents' education (Klebanov, Brooks-Gunn, & Duncan, 1994; Haveman & Wolfe, 1995; Smith, Brooks-Gunn, & Klebanov, 1997) as well as by parents' work experience (Stewart & Barling, 1996). Further, it has been researched that high education of parents has a positive influence on children's academic performance (Hoff, 2003). This positive influence is reasoned by researchers on the assumption that parents learn things in school, that influences the interaction with their children around learning activities (Eccles et al., 1993) along with the findings that high educated people try to give their children the best educational opportunities (Furstenberg et al., 1999). Since the effect on academic performance already has been researched variously, there is a gap to what extent the influence of parents on particular traits or skills can be measured and in case of this paper the influence on the individuals' innovativeness based on exploration and exploitation. It is relevant to address this aspect because especially in today's fast changing world the demand for innovative people is very high and companies are always looking for innovative people. Therefore, this study aims to come to the conclusion that parents are able to set stimulations that influences innovativeness of their children and these stimulations might be desirable to be supported.

The previous outlines lead to the assumption that parents with a higher level of education have a more positive influence on

their children's innovativeness than parents with a lower level of education (Figure 1). This assumption is based on the aforementioned influences more educated parents have on their children. Additionally it is assumed that high educated people tend to follow academic professions, which most likely leads to a higher family income. Hence, a higher family income gives individuals a higher financial stability and therefore might increase the willingness of risk taking, which is positively related to innovativeness (Hyrsky & Tuunnen, 1999). In addition, as explained by Furstenberg people with a high education are interested in exposing their children to the best education possible as well as to extra curricular activities, which lead to a broader collection of experience and experience. This also a known as an influence on innovative thinking (Bhaduri & Worch, 2007).

Since innovativeness is commonly associated with the work experience someone had or how companies support innovative behavior, it might be the case that innovativeness is build or influenced long before that process or time. Thus, regarding the future, if it turns out that innovativeness is positively influenced by an academic profession and education of parents it may be of academic relevance to look deeper into how exactly there is a difference between the influence taken of parents with an academic profession/education and non academic profession/education. Hence, if this factor could be determined there might be the possibility to support children from non-academic parents to equally educate them and give them the same opportunities and to lower inequality.



Various authors have already investigated the relationship between innovativeness and numerous variables. Many turned out to be a driving factor. Still neither the educational level nor their profession has been researched as an influencing driver on individuals' innovativeness. This gap in the literature could be relevant for companies looking for innovative employees as well as for the government it turns out that children from parents with an academic education or profession have an advantage.

Considering the stated practical relevancies of future exploration of drivers for innovativeness the following research question will guide the investigation presented in this paper:

*To what extent does the profession and education of parents influence individuals' innovativeness?*

This paper will contribute to the existing literature by investigating the influence of parents' profession and education on their children's innovativeness.

## 2. THEORETICAL FRAMEWORK

### 2.1 Innovativeness, innovation and creativity

Innovativeness has many different definitions as one is from Rogers and Shoemakers (1971, p. 27) innovativeness is "the degree to which an individual is relatively earlier in adopting an innovation than other members of his social system". Critique to this definition is that it lacks a measurement of when an innovation is adopted by a social system. A second definition is

“the degree to which an individual is receptive to new ideas and makes innovation decisions independently of the communicated experience of others” (Midgley and Dowing, 1979, p. 236). Both conceptualizations underlay the possible error that newness or novelty is based on perception. There are even authors that refer to innovativeness particularly, which means it is seen as an independent term, but it is often used interchangeably with creativity and innovation.

Creativity “has to do with the production of novel and useful ideas” (Scott & Bruce, 1994, p.3) as well as it is often referred to as doing something new or creating something new (Woodman, Sawyer & Griffin, 1993). Where innovation has to do with the adoption and implementation of useful ideas (Kanter, 1988), further it is referred to as being an intentional introduction or application of for example processes or procedures (West & Farr, 1990). Hence, creativity is more strongly linked to idea generation and innovation to idea implementation (Rank et al., 2004). The main difference is the extent of the novelty of the idea: when referring to creativity the idea is truly novel, where in innovation the idea can be based on previous experimentations of others (Rank et al., 2004). Additionally, creativity has a greater variety of applications and is used in art, music, business and design, where innovation is more linked to business or science applications. Further, innovation can be seen as inter-individual social process and creativity rather as inter-individual cognitive process (Anderson & King, 1993). Another point of view by West and Farr (1990) is that they consider “creativity as the ideation component of innovation and innovation as encompassing both the proposal and application of the new ideas” (p. 10). In addition, there is a major difference between creativity and innovation, which needs to be highlighted: innovation on the one side is seen as a multiple stage process, creativity on the other side rather as a particular event (Scott & Bruce, 1994). During the course of this paper innovativeness will be split into exploration and exploitation activities, because based on their definitions they can be seen as separate activities but both influence innovative behavior and therefore firm performance (Molina-Castillo et al., 2011).

Innovation is often split into these two activities. Exploration is referred to the activity of exploring something new or discovering a novelty and exploitation is the development or improvement of existing technology or processes (Gupta, Smith & Shally, 2006).

## 2.2 Parental influence

The literature is full of articles covering multiple topics in which way parents can influence their children’s attitude, values and personality. “Parents transmit values and attributes as well as purchasing habits, brand preferences, and so on to their children” (Cotte & Wood, 2004, p. 79). According to Kagan (1999) parents have three different mechanisms to influence their children: direct interactions with the child, emotional identification of the child with either only one parent or both parents, and the influence of stories about relatives which probably achieved something the child might want to identify him- or herself with. It is argued in the literature, which factor actually has the biggest influence on children and it is always difficult to narrow it down to only one particular influence because it is most likely that the influences are associated with each other. Parents that have a high education and achieved an academic degree and therefore follow an academic profession are likely to have a high income which allows these families to send their children to better schools or live in a safer area (Eccles & Kean, 2005). Further, if the parents themselves have an academic education they are more likely to have a broader

knowledge, which allows them to transmit more knowledge and experience to their children (Eccles, 1993; Hoff, 2003). As in most western cultures, it is assumed that mothers spend more time with the education of their children since they usually spend their time at home when their kids are too young to stay home alone. It is stated to be two to three times the amount of time than the fathers since they are mostly out at work (Craig, 2006). Contradicting to this assumption are articles stating a changing world view in western countries due to the fact that more women work. The number of fathers staying at home increases, too. This higher involvement of fathers in the child education is assumed to have an influence on their children (Allen & Daly, 2007). Due to these two views on the influence of mothers and fathers, this paper will distinguish between the influence of the fathers and the mothers on children. Further the effect of both parents together will be examined as well.

## 2.3 The Link between innovativeness and the education and profession of parents

It has been researched that parents’ education and profession has an influence on children’s development as well as that family can have an influence on children’s innovativeness. Particularly this influence has been researched by Cotte and Wood (2004) they found that the more children perceive their parents as innovative the more innovative they are themselves. But the exact link between parents’ profession as well as education and individual’s innovativeness has not been studied so far, but based on existing literature assumptions about an existing relationship can be made. Innovativeness is viewed as a personality construct, which is therefore influenced in the same way as other personality traits (Hirschman, 1980). Hence, it can be expected that families where both parents have an academic profession and education their children’s innovativeness is positively influenced because their parents can draw on wider knowledge which can be transferred to their children. Furthermore, there is an increased likelihood of a higher income, which allows them to send their children to schools with a better reputation and to live in a safe environment (Eccles & Kean, 2005). In their article Eccles & Kean (2005) describe a safer environment as living in an area with low criminality, playgrounds and a child friendly environment, where parents can let their children play outside and leave them space to make experiences on their own.

When looking at the current trend within the quick changing business world and also the development of customer expectations, skills like creativity, flexibility, and innovativeness has become more important than ever. Competition between companies becomes increasingly intense and abilities to react quickly and constantly innovate are crucial to sustain competitive advantage (Conway & Steward, 2009). Therefore, it can be assumed that organizations will increase their efforts in staying innovative by not only investing more into R&D but also by seeking more innovative employees.

Concluding it can be assumed that parents with an academic degree have a positive influence on their children’s development and achievements but there might be a difference between the influence of the father and of the mother. Therefore, the following hypotheses emerge:

*H1: Children where their father has a profession, which requires an academic degree, show a higher level of innovativeness later in life than children where their father has a profession, which requires no academic degree.*

*H2: Children where their mother has a profession, which requires an academic degree, show a higher level of*

innovativeness later in life than children where their mother has a profession, which requires no academic degree.

H3: Children where both parents have a profession, which requires an academic degree, show a higher level of innovativeness later in life than children with parents with a profession, which requires no academic degree.

Further to test the influence of parents education on innovativeness including the difference between mothers and fathers the following hypotheses will be analyzed:

H4: Children where their father has an academic education, show a higher level of innovativeness later in life than children where their father has no academic education.

H5: Children where their mother has an academic education, show a higher level of innovativeness later in life than children where their mother has no academic education.

H6: Children where both parents have an academic education, show a higher level of innovativeness later in life than children where both parents have no academic education.

### 3. METHOD

To investigate the outlined research problem a survey has been conducted by a team, consisting of four researchers. The survey consisted of 34 questions, 20 of these were to collect the relevant data for the independent variables. The independent variables differed among the 4 researchers therefore not all of the 20 questions were relevant for this paper, only the variables concerning the control variables and the profession and education of parents. The remaining 14 questions, to measure the dependent variables were deduced from Mom et al. (2009).

The survey was conducted online via Google forms and was mostly spread via Facebook and email. It was also conducted semi-anonymously, which means that the researchers know the participants and their answers but the identity will not be made public. The survey is semi-anonymous because it is a convenient sample, which means the respondents are mostly friends or acquaintances and therefore known by the researcher. This way of acquiring respondents made it easier to collect the data. It was targeted to get 100 respondents by asking friends or acquaintances, which turned out to be difficult. Therefore a trade-off was made that friends ask their friends to fill out the survey. This process helped to nearly get the 100 respondents within a week but made it nearly impossible to give a respondents rate because it cannot be said to how many people the survey was finally sent. The number of 100 people to answers the survey was chosen because it is considered to be a reasonable number of responses to deliver a valid outcome for this study (De Vaux et al., 2013). The respondents were on average all older than 30 years, have an academic degree and come from various industries, which makes the study more generalizable.

Independent variables: *Parents profession & Education*

The independent variables in this particular paper are the profession and the educational level of the respondent's parents. This information was gathered in the survey, where the respondents had to fill in the profession of their parents into a blank box, which gave a wide variety of professions. The educational level of their parents, had to be chosen from one out of the following seven options, where the highest achieved had to be ticked: 1. High-school 2. MBO 3. HBO (University of applied science) 4. Bachelor Degree at University 5. Master/ drs 6. Doctoral Degree/ PhD 7. Others. The survey was mainly aligned with the Dutch educational system, hence the option "others" was to fill in older degree names or names of degrees

from a different countries before the Bologna Process starting in 1999 (Keeling, 2006)

Dependent variable: *Innovativeness*

The questions deducted, to examine innovativeness were developed by Mom, Bosch and Volberda, consisting of seven questions to measure exploration and seven questions to measure exploitation. The questions were for example for exploration: "To what extent did you, last year, engage in work related activities that can be characterized as follows: Activities requiring quite some adaptability of you?" Or for exploitation: "To what extent did you, last year, engage in work related activities that can be characterized as follows: Activities primarily focused on achieving short-term goals?" These questions had to be answered on a seven point Likert scale from (1) to a very small extent to (7) to very large extent (Mom et al., 2009). See appendix for full list of the questions used.

The measurement is considered reliable and valid since the related article was cited 214 times. Two of the exploration questions had to be replaced since these were pointed to specifically at managers, which was not suitable for this study. Instead two questions were deducted from (Vermeulen, O'shaughnessy & De Jong, 2003)

This is not common practice but was necessary due to the reason mentioned.

Control variables:

The variables age, gender, tenure and work experience are already know as influencer of innovativeness (Duysters et. al, 2012) and are therefore chosen as control variables.

The timeframe for the data collection was seven days and 99 answers were received. 93 answers were used to further proceed, six cases had to be excluded due to the fact that one of the requirements on our respondents were to be older then 30 years. The data analysis was done with SPSS, first the usual descriptive statistics as minimum and maximum, mean and standard deviation. For the main analyses two multivariate ANCOVAs were used. This analysis is used because we have multiple explanatory variables and two related outcome variables. Additionally, this allows investigation into a potential interaction effect for both variables education and profession between the father and the mother (Seltman, 2014). For all analyses an  $\alpha$  of .05 is handled.

The data was normally distributed and the construct reliability was tested by Cronbach's Alpha, which is 0.88 for exploration and 0.82 for exploitation.

Reliability Statistics		Reliability Statistics	
Cronbach's Alpha	N of Items	Cronbach's Alpha	N of Items
.882	7	.823	7

Since the outcome of the Cronbach's Alpha is for both between 0.7 and 0.9 it is considered reliable (George & Mallery, 2003).

Hence the data, about the education and profession of the parents were collected as a string variable. Two numeric dummy variables were made to sort the different kind of professions and educations into academic and non-academic.

**Table 1. Classification of Profession and Education into Academic and Non-academic for dummy variable (Profession only exemplified)**

Academic	Yes	No
Profession	- Teacher	- Farmer

	- Architect - Doctor - School director	- Firefighter - Hairdresser - Housewife
Education	- Bachelor at University - Bachelor at University of applied science - Master/ drs. - PhD	- High school - MBO

#### 4. RESULTS

##### Descriptive statistics:

Table 2 gives an overview of the most important descriptive statistics. Extreme outliers, which had an average exploration or exploitation value of " $\leq 1$ " were removed, this was done to avoid a falsification of the outcome. Furthermore, respondents with only a High-school degree, which had no work experience and therefore no tenure, were removed since these were requirements for our respondents. After this process 84 cases were left (N=84). The mean age is 43.55 years, with a minimum of 30 and a maximum of 64 and the standard deviation is 9.47 years. The means for the variables exploration (explorscale) and exploitation (exploitscale) are 4.74 and 4.63 respectively. The minimum for exploration is 2.43 and for exploitation 2.86 and the maxima are 6.57 for both variables. The standard deviation for exploration is 1.23 and 0.85 for exploitation. The mean for the variable work experience is 19.77 years, with a minimum of 2 and maximum of 46 years. The standard deviation is 10.22. For the variable tenure the mean is 11.96, the minimum is 1 and the maximum is 35 with a standard deviation of 9.58.

**Table 2: Descriptive Statistics**

	N	Minimum	Maximum	Mean	Std. Deviation
Age	84	30	64	43.68	9.459
Exploration Scale	84	2.43	6.57	4.7517	1.12794
Exploitation Scale	84	2.86	6.57	4.6412	.84922
Workexperience	84	2	46	19.77	10.220
Tenure	84	1	35	11.96	9.576
Valid N (listwise)	84				

##### Frequencies:

Table 3 gives an overview over the frequency of how many fathers follow an academic profession, 14 of the 84 total respondents' fathers do and 80 do not.

**Table 3: Frequency of Academic Professions among Fathers**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid No Academic Profession	70	83.3	83.3	83.3
Academic Profession	14	16.7	16.7	100.0
Total	84	100.0	100.0	

Table 4 displays how many mothers of the respondents follow an academic profession. 11 Mothers follow an academic profession and 73 do not.

**Table 4: Frequency of Academic Professions among Mothers**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid No Academic Profession	73	86.9	86.9	86.9
Academic Profession	11	13.1	13.1	100.0
Total	84	100.0	100.0	

In Table 5 the frequency of fathers having an academic education is shown, 37 have an academic degree and 47 do not.

**5: Frequency of Academic Education among Fathers**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid No Academic Education	47	56.0	56.0	56.0
Academic Education	37	44.0	44.0	100.0
Total	84	100.0	100.0	

In the case of the respondent's mothers, 19 have an academic education and 65 do not have an academic degree, which is displayed in table 6.

**Table 6: Frequency of Academic Education among Mothers**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid No Academic Education	65	77.4	77.4	77.4
Academic Education	19	22.6	22.6	100.0
Total	84	100.0	100.0	

In Table 7 on page 6 the correlations between the dependent, independent and control variables are displayed. Between exploration/exploitation of the children and the profession/education of the parents no significant correlation can be seen. A significant correlation can be seen between the education of the father and the profession of the father (Pearson's  $r = .504$ ;  $n = 84$ ;  $p < 0.05$ ), the same applies for the mother (Pearson's  $r = .549$ ;  $n = 84$ ;  $p < 0.01$ ). This shows that if the mother or father has an academic degree the likelihood is higher that they have an academic profession. Further, there is a correlation that if the father has an academic education, the mother is more likely to have an academic education (Pearson's  $r = .380$ ;  $n=84$ ;  $p < 0.01$ ). A similar correlation can be identified if the father has an academic profession the mother is more likely to have an academic profession (Pearson's  $r = .489$ ;  $n=84$ ;  $p < 0.01$ ). Another significant correlation can be seen between the age of the respondent and the education of his/her mother. As the age of the respondents increases the number of mothers with an academic education decreases (Pearson's  $r = -.233$ ;  $n=84$ ;  $p < 0.05$ ). A different historical background could explain this, because the older the respondent the more reasonable it is to assume that his/her mother is older too. And the older the mother the more it is likely that she grew up in times when it was not very common to have an academic degree, especially for woman.

##### Main analyses:

Investigation into main and interaction effects via the first ANCOVA on the dependent variable child's innovativeness with independent variables parents' professions, and control variables age, gender, tenure and work experience are described. The outcomes of the multivariate ANCOVA are shown in Table 8. Innovativeness is measured by exploration and exploitation. Main effect of father's profession was statistically not significant (Wilks' Lambda = 1.00;  $F(2;75) = 0.07$ ;  $p = .94$ ). Main effect of mother's profession was statistically not significant (Wilks' Lambda = 0.94;  $F(2;75) = 2.23$ ;  $p = .12$ ). Interaction effect between father's and mother's profession was statistically not significant (Wilks' Lambda = 0.97;  $F(2;75) = 1.3$ ;  $p = .28$ ). No statistically significant effect was found for the control variables.

Table 7: Correlation

	Exploration Scale	Exploitation Scale	Workexperience	Tenure	Age	Father with Academic Profession	Mother with Academic Profession	Father with Academic Education	Mother with Academic Education
Exploration Scale	1	.090	.029	-.155	-.013	.018	-.139	.108	-.051
Pearson Correlation		.416	.792	.159	.906	.873	.208	.329	.647
Sig. (2-tailed)		.84	.84	.84	.84	.84	.84	.84	.84
N									
Exploitation Scale	.090	1	.069	.086	.083	.087	.183	.061	.114
Pearson Correlation			.534	.434	.451	.429	.096	.584	.301
Sig. (2-tailed)		.84	.84	.84	.84	.84	.84	.84	.84
N									
Workexperience	.029	.069	1	.647**	.964**	.029	-.106	-.068	-.260*
Pearson Correlation				.000	.000	.795	.337	.541	.017
Sig. (2-tailed)		.84	.84	.84	.84	.84	.84	.84	.84
N									
Tenure	-.155	.086	.647**	1	.667**	-.025	-.065	-.105	-.261*
Pearson Correlation					.000	.820	.555	.342	.016
Sig. (2-tailed)		.84	.84	.84	.84	.84	.84	.84	.84
N									
Age	-.013	.083	.964**	.667**	1	.046	-.084	-.074	-.233*
Pearson Correlation						.679	.446	.502	.033
Sig. (2-tailed)		.84	.84	.84	.84	.84	.84	.84	.84
N									
Father with Academic Profession	.018	.087	.029	-.025	.046	1	.489**	.504**	.445**
Pearson Correlation							.000	.000	.000
Sig. (2-tailed)		.84	.84	.84	.84	.84	.84	.84	.84
N									
Mother with Academic Profession	-.139	.183	-.106	-.065	-.084	.489**	1	.295**	.549**
Pearson Correlation								.006	.000
Sig. (2-tailed)		.84	.84	.84	.84	.84	.84	.84	.84
N									
Father with Academic Education	.108	.061	-.068	-.105	-.074	.504**	.295**	1	.380**
Pearson Correlation									.000
Sig. (2-tailed)		.84	.84	.84	.84	.84	.84	.84	.84
N									
Mother with Academic Education	-.051	.114	-.260*	-.261*	-.233*	.445**	.549**	.380**	1
Pearson Correlation									
Sig. (2-tailed)		.84	.84	.84	.84	.84	.84	.84	.84
N									

\*\* . Correlation is significant at the 0.01 level (2-tailed).

\* . Correlation is significant at the 0.05 level (2-tailed).

**Table 8: Multivariate Test for the Academic Profession of the Mother and Father**

Effect		Value	F	Hypothesis df	Error df	Sig.
Intercept	Pillai's Trace	.290	15.302 <sup>b</sup>	2.000	75.000	.000
	Wilks' Lambda	.710	15.302 <sup>b</sup>	2.000	75.000	.000
	Hotelling's Trace	.408	15.302 <sup>b</sup>	2.000	75.000	.000
	Roy's Largest Root	.408	15.302 <sup>b</sup>	2.000	75.000	.000
fatherprofessionaca	Pillai's Trace	.002	.065 <sup>b</sup>	2.000	75.000	.938
	Wilks' Lambda	.998	.065 <sup>b</sup>	2.000	75.000	.938
	Hotelling's Trace	.002	.065 <sup>b</sup>	2.000	75.000	.938
	Roy's Largest Root	.002	.065 <sup>b</sup>	2.000	75.000	.938
motherprofessionaca	Pillai's Trace	.056	2.225 <sup>b</sup>	2.000	75.000	.115
	Wilks' Lambda	.944	2.225 <sup>b</sup>	2.000	75.000	.115
	Hotelling's Trace	.059	2.225 <sup>b</sup>	2.000	75.000	.115
	Roy's Largest Root	.059	2.225 <sup>b</sup>	2.000	75.000	.115
fatherprofessionaca * motherprofessionaca	Pillai's Trace	.033	1.298 <sup>b</sup>	2.000	75.000	.279
	Wilks' Lambda	.967	1.298 <sup>b</sup>	2.000	75.000	.279
	Hotelling's Trace	.035	1.298 <sup>b</sup>	2.000	75.000	.279
	Roy's Largest Root	.035	1.298 <sup>b</sup>	2.000	75.000	.279
Gender	Pillai's Trace	.005	.204 <sup>b</sup>	2.000	75.000	.816
	Wilks' Lambda	.995	.204 <sup>b</sup>	2.000	75.000	.816
	Hotelling's Trace	.005	.204 <sup>b</sup>	2.000	75.000	.816
	Roy's Largest Root	.005	.204 <sup>b</sup>	2.000	75.000	.816
Age	Pillai's Trace	.021	.790 <sup>b</sup>	2.000	75.000	.458
	Wilks' Lambda	.979	.790 <sup>b</sup>	2.000	75.000	.458
	Hotelling's Trace	.021	.790 <sup>b</sup>	2.000	75.000	.458
	Roy's Largest Root	.021	.790 <sup>b</sup>	2.000	75.000	.458
Workexperience	Pillai's Trace	.035	1.360 <sup>b</sup>	2.000	75.000	.263
	Wilks' Lambda	.965	1.360 <sup>b</sup>	2.000	75.000	.263
	Hotelling's Trace	.036	1.360 <sup>b</sup>	2.000	75.000	.263
	Roy's Largest Root	.036	1.360 <sup>b</sup>	2.000	75.000	.263
Tenure	Pillai's Trace	.056	2.213 <sup>b</sup>	2.000	75.000	.116
	Wilks' Lambda	.944	2.213 <sup>b</sup>	2.000	75.000	.116
	Hotelling's Trace	.059	2.213 <sup>b</sup>	2.000	75.000	.116
	Roy's Largest Root	.059	2.213 <sup>b</sup>	2.000	75.000	.116

In the following, to test for every hypothesis if the effect differs on exploration and exploitation, Table 9 displays the SPSS output of The Test of Between-Subject Effects of the independent variable academic profession and control variables on exploration and exploitation. There is no significance to be seen except a trend for the control variable tenure. Therefore the first hypothesis H1: "Children where their father has a profession, which requires an academic degree, show a higher level of innovativeness later in life than children where their father has a profession, which requires no academic degree." also has to be rejected for exploration ( $F(1; 76) = 0.05; p = .83$ ) and exploitation ( $F(1; 76) = 0.1; p = .75$ ). The second hypothesis H2: "Children where their mother has a profession, which requires an academic degree, show a higher level of innovativeness later in life than children where their mother has a profession, which requires no academic degree." has to be rejected as well, because of the value for exploration ( $F(1; 76) = 1.59; p = .21$ ) and for exploitation ( $F(1; 76) = 2.22; p = .14$ ). The last hypothesis, which assumed that there is an interaction effect if both parents have in academic profession H3: "Children where both parents have a profession, which requires an academic degree, show a higher level of innovativeness later in life than children with parents with a profession, which requires no academic degree." has to be rejected as well for exploration ( $F(1; 76) = 1.34; p = .24$ ) and for exploitation ( $F(1; 76) = .846; p = .36$ ).

**Table 9: Test of Between-Subject Effects for Academic Profession**

Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	Exploration Scale	11.545 <sup>a</sup>	7	1.649	1.333	.247
	Exploitation Scale	3.386 <sup>b</sup>	7	.484	.651	.712
Intercept	Exploration Scale	25.058	1	25.058	20.248	.000
	Exploitation Scale	11.571	1	11.571	15.573	.000
fatherprofessionaca	Exploration Scale	.055	1	.055	.045	.833
	Exploitation Scale	.078	1	.078	.104	.748
motherprofessionaca	Exploration Scale	1.964	1	1.964	1.587	.212
	Exploitation Scale	1.651	1	1.651	2.221	.140
fatherprofessionaca * motherprofessionaca	Exploration Scale	1.709	1	1.709	1.381	.244
	Exploitation Scale	.628	1	.628	.846	.361
Gender	Exploration Scale	.504	1	.504	.407	.525
	Exploitation Scale	.000	1	.000	.001	.981
Age	Exploration Scale	1.573	1	1.573	1.271	.263
	Exploitation Scale	.113	1	.113	.152	.697
Workexperience	Exploration Scale	3.039	1	3.039	2.456	.121
	Exploitation Scale	.065	1	.065	.087	.768
Tenure	Exploration Scale	4.788	1	4.788	3.869	.053
	Exploitation Scale	.162	1	.162	.218	.642
Error	Exploration Scale	94.052	76	1.238		
	Exploitation Scale	56.471	76	.743		
Total	Exploration Scale	2002.204	84			
	Exploitation Scale	1869.245	84			
Corrected Total	Exploration Scale	105.597	83			
	Exploitation Scale	59.857	83			

a. R Squared = .109 (Adjusted R Squared = .027)

b. R Squared = .057 (Adjusted R Squared = -.030)

Further analyzed, disregarding that no overall effect of tenure was found in Table 8, a not significant effect, but a trend was observable for tenure on exploration ( $F(1; 76) = 3.87; p = .05; p < .10$ ). To further check the direction of the found tendency for the control variable tenure a Parameter Estimate has been conducted. The table shows (tenure 90% CI<sub>B</sub> = [-0.06; - 0.01]), which means that there is a negative effect of tenure on exploration, which is in line with the literature.

In the following part the investigation into main and interaction effects via the second ANCOVA on the dependent variable child's innovativeness with independent variables parents' education, and control variables age, gender, tenure and work experience are described. The outcomes of the multivariate ANCOVA are shown in Table 10. Innovativeness is measured by exploration and exploitation. Main effect of father's education was statistically not significant (Wilks' Lambda = .97;  $F(2;75) = 1.3; p = .28$ ). Main effect of mother's education was statistically not significant (Wilks' Lambda = 0.99;  $F(2;75) = .55; p = .58$ ). Interaction effect between father's and mother's education was statistically not significant (Wilks' Lambda = 0.96;  $F(2;75) = 1.63; p = .2$ ). There was also no statistically significant effect found for the control variables.

**Table 10: Multivariate Test for the Academic Education of the Mother and Father**

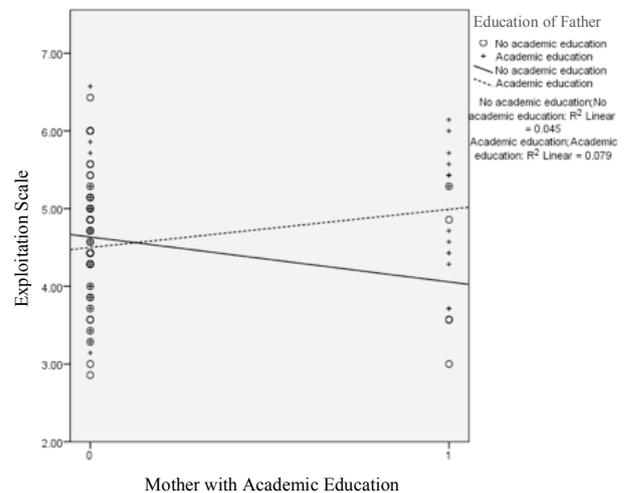
Effect		Value	F	Hypothesis df	Error df	Sig.
Intercept	Pillai's Trace	.297	15.841 <sup>b</sup>	2.000	75.000	.000
	Wilks' Lambda	.703	15.841 <sup>b</sup>	2.000	75.000	.000
	Hotelling's Trace	.422	15.841 <sup>b</sup>	2.000	75.000	.000
	Roy's Largest Root	.422	15.841 <sup>b</sup>	2.000	75.000	.000
educationfatheraca	Pillai's Trace	.034	1.301 <sup>b</sup>	2.000	75.000	.278
	Wilks' Lambda	.966	1.301 <sup>b</sup>	2.000	75.000	.278
	Hotelling's Trace	.035	1.301 <sup>b</sup>	2.000	75.000	.278
	Roy's Largest Root	.035	1.301 <sup>b</sup>	2.000	75.000	.278
educationmotheraca	Pillai's Trace	.015	.553 <sup>b</sup>	2.000	75.000	.578
	Wilks' Lambda	.985	.553 <sup>b</sup>	2.000	75.000	.578
	Hotelling's Trace	.015	.553 <sup>b</sup>	2.000	75.000	.578
	Roy's Largest Root	.015	.553 <sup>b</sup>	2.000	75.000	.578
educationfatheraca * educationmotheraca	Pillai's Trace	.042	1.625 <sup>b</sup>	2.000	75.000	.204
	Wilks' Lambda	.958	1.625 <sup>b</sup>	2.000	75.000	.204
	Hotelling's Trace	.043	1.625 <sup>b</sup>	2.000	75.000	.204
	Roy's Largest Root	.043	1.625 <sup>b</sup>	2.000	75.000	.204
Gender	Pillai's Trace	.028	1.072 <sup>b</sup>	2.000	75.000	.348
	Wilks' Lambda	.972	1.072 <sup>b</sup>	2.000	75.000	.348
	Hotelling's Trace	.029	1.072 <sup>b</sup>	2.000	75.000	.348
	Roy's Largest Root	.029	1.072 <sup>b</sup>	2.000	75.000	.348
Age	Pillai's Trace	.018	.703 <sup>b</sup>	2.000	75.000	.498
	Wilks' Lambda	.982	.703 <sup>b</sup>	2.000	75.000	.498
	Hotelling's Trace	.019	.703 <sup>b</sup>	2.000	75.000	.498
	Roy's Largest Root	.019	.703 <sup>b</sup>	2.000	75.000	.498
Workexperience	Pillai's Trace	.032	1.235 <sup>b</sup>	2.000	75.000	.297
	Wilks' Lambda	.968	1.235 <sup>b</sup>	2.000	75.000	.297
	Hotelling's Trace	.033	1.235 <sup>b</sup>	2.000	75.000	.297
	Roy's Largest Root	.033	1.235 <sup>b</sup>	2.000	75.000	.297
Tenure	Pillai's Trace	.063	2.534 <sup>b</sup>	2.000	75.000	.086
	Wilks' Lambda	.937	2.534 <sup>b</sup>	2.000	75.000	.086
	Hotelling's Trace	.068	2.534 <sup>b</sup>	2.000	75.000	.086
	Roy's Largest Root	.068	2.534 <sup>b</sup>	2.000	75.000	.086

Table 11 shows the output of the Test of Between-Subject Effects, which examines the effect of the father's and mother's education on their children's innovativeness. This test was conducted to check the significance for hypothesis four, five and six.

For exploration ( $F(1; 76) = 1.55; p = .22$ ) and for exploitation ( $F(1; 76) = 1.41; p = .24$ ), no significance is found concerning the effect of the academic education of the father on the innovativeness of his child. Therefore, the following hypothesis needs to be rejected  $H4$ : "Children where their father has an academic education, show a higher level of innovativeness later in life than children where their father has no academic education". For the fourth hypothesis  $H5$ : "Children where their mother has an academic education, show a higher level of innovativeness later in life than children where their mother has no academic education" the values for exploration are ( $F(1; 76) = 1.01; p = .32$ ) and for exploitation ( $F(1; 76) = 0.04; p = .84$ ), therefore it needs to be rejected. The last hypothesis  $H6$ : "Children where both parents have an academic education, show a higher level of innovativeness later in life than children where both parents have no academic education." needs to be rejected due to exploration ( $F(1; 76) = .03; p = .86$ ) and exploitation ( $F(1; 76) = 3.29; p = .07$ ). Here the  $p$ -value for exploitation shows a trend, which is still not a significant outcome especially since Wilks' Lambda in Table 10 already showed that there is no significance. To further investigate the tendency of the effect of the interaction effect between mother and father, when both have an academic education on exploitation, Pairwise Comparison Bonferroni confidence intervals were calculated to see the direction of the interaction effect. This was done under the consideration that this is usually not done in practice when the overall analysis is not significant. It can be seen that given the mother is having an academic education, there is a difference between the father is having an academic education or not. There is a positive effect if the

mother has an academic degree as well as if the father has it (90% CI = [0.01; 1.67]) (see Appendix 8.3). This effect is displayed in the Graph 1. The dashed line shows the effect if additionally the father has an academic education. It indicates an increase in exploitation if both parents have an academic education.

**Graph 1: Interaction affect between Mother and Father having an Academic Education on Exploitation**



**Table 11: Test of Between-Subject Effects for Academic Education**

Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	Exploration Scale	10.825 <sup>a</sup>	7	1.546	1.240	.292
	Exploitation Scale	4.303 <sup>b</sup>	7	.615	.841	.557
Intercept	Exploration Scale	24.813	1	24.813	19.899	.000
	Exploitation Scale	11.807	1	11.807	16.152	.000
educationfatheraca	Exploration Scale	1.934	1	1.934	1.551	.217
	Exploitation Scale	1.032	1	1.032	1.411	.239
educationmotheraca	Exploration Scale	1.261	1	1.261	1.011	.318
	Exploitation Scale	.030	1	.030	.041	.840
educationfatheraca * educationmotheraca	Exploration Scale	.041	1	.041	.033	.856
	Exploitation Scale	2.406	1	2.406	3.291	.074
Gender	Exploration Scale	1.575	1	1.575	1.263	.265
	Exploitation Scale	.476	1	.476	.651	.422
Age	Exploration Scale	1.476	1	1.476	1.184	.280
	Exploitation Scale	.091	1	.091	.125	.725
Workexperience	Exploration Scale	2.749	1	2.749	2.205	.142
	Exploitation Scale	.094	1	.094	.129	.721
Tenure	Exploration Scale	4.947	1	4.947	3.967	.050
	Exploitation Scale	.498	1	.498	.681	.412
Error	Exploration Scale	94.771	76	1.247		
	Exploitation Scale	55.554	76	.731		
Total	Exploration Scale	2002.204	84			
	Exploitation Scale	1869.245	84			
Corrected Total	Exploration Scale	105.597	83			
	Exploitation Scale	59.857	83			

a. R Squared = .103 (Adjusted R Squared = .020)  
 b. R Squared = .072 (Adjusted R Squared = -.014)

Further analyzed, disregarding that no overall effect of tenure was found in Table 11 a not significant effect, but a trend was observable for tenure on exploration ( $F(1; 76) = 3.97; p = .05; p < .10$ ). To further check the direction of the found tendency for the control variable tenure a Parameter Estimate has been conducted. The table shows (tenure 90% CI<sub>B</sub> = [-0.07; -0.01]) that means that there is a negative effect of tenure on exploration, which is in line with the literature.

## 5. DISCUSSION

The aim of this research paper was to answer the question: "To what extent does the profession and education of parents influence individuals' innovativeness?" It needs to be stated

clearly that this study in the beginning refers to innovativeness but then differentiates between exploration and exploitation. This was done due to the measurement of Mom et al., (2009) as well as to see if the effects on these two differ but still innovativeness can be used as an umbrella term for these two. Drawing from the collected data of this study it seems it cannot be said that there is significant influence of parents' profession and education on their children's innovativeness. This outcome is arguable because Cotte and Wood (2004) found out that children's innovativeness is influenced by their perception of the innovativeness of their parents. This means that if parents show a high innovativeness, which can be influenced by their profession (Patterson, Kerrin & Gatto-Roissard, 2009) or education (Okhomina, 2007), their children perceive them as innovative. This influences the children's innovativeness and implies that there might be an indirect influence since the direct influence was not proven by means of this study. Multiple explanations can be found for the result, that no significant effect was identified during this study. First of all it is possible that there was no significant effect because the parents of the respondents must be relatively old since the average age of our respondents was 44 years and therefore their parents might be 60+. This means that the parents were born approximately around 1930 – 1950, during these times the number of people having an academic degree was not as high as today. In that time not as many people had an academic degree. That fact might explain that there is no measureable effect on children's innovativeness. This would probably be different, if the parents were younger. An indicator that the parents, who are one generation younger than the ones from the respondents, show a higher level of innovativeness is that many people at the age of 40-60 are today more familiar with technology because its perceived that they are more likely to adapt to for example smartphones and computers. This would imply, regarding to Cotte and Wood (2004) that these parents have a bigger influence on their child's innovativeness. Another possible explanation for the not significant effect can be, since our respondents were all 30 years and older, that there are more factors than their parents, influencing innovativeness, like work experience or labour conditions (Patterson et al., 2009) & (Soto et al., 2011). Hence, if a measurement would be used, which does not predict innovativeness from working activities and therefore respondents at the age of 20 could be asked a different effect might show. Further, even the measured effects were not significant. A positive effect on exploitation has been found if both parents have an academic education. This implies that there is some kind of relationship, which needs to be examined from a different angle or with a different measurement. This would support a preconceived practical relevance for this study, which was that if there would have been an indication that children from parents with an academic degree show a higher innovativeness that could have been an implication for the government or companies to support children from non-academic families to give them the same opportunities. Due to the not significant effect of education and profession on exploration and exploitation it was not further researched if there is another outcome if parents have both, an academic degree and an academic profession. This was not done because it was not prepared in the study and would exceed the scope of this bachelor thesis. This remains a topic for future research.

Innovation has an enormous priority for many companies and to examine the preconditions for innovativeness is necessary. Research has shown that the innovativeness of an organisation depends on the innovative behaviour of its employees. Accordingly, organisations need to know how they can

influence innovativeness but also what influences employees upfront.

## 6. LIMITATIONS & FURTHER RESEARCH

A first limitation of this study is the number of respondents, because 99 respondents is a reasonable number to get a valid outcome but not big enough to conclude over a specific population. There were different nationalities as well as a big variety of ages, jobs and work experiences, which makes the study generalizable but difficult to conclude for example for Dutch people or people between the age of 30-40 years. By testing the data not only on the before mentioned hypotheses but also on other assumptions it was further confirmed that the sample is too small to state a significant relevance because after setting more or different filters only a fraction of the original number of respondents was left. Additionally, the study is based on the assumption that the children have grown up with both parents and are therefore under the influence of the professions and the educational level of both parents. It does not take into account that some children might grow up with a single parent, with other siblings or with their grandparents in the same accommodation. Further, it is not specified that children might spend more time with either the mother or the father due to work sharing.

Since the data for this study was mostly drawn from a convenient sample it can be criticized that the researcher could have chosen people, he assumes fit best to his assumptions. Additionally, it has to be admitted that the original number of respondents drawn from the convenient sample was too small and more respondents were acquired through Facebook and word of mouth by friends and family. It can not be said for sure that all answers are trustworthy.

For further research, a larger number of respondents would be necessary to test or more significant outcomes. It would also be interesting to research the effects on particular parts of the population.

Despite these limitations, this study seems to give interesting insights into the topic about the relation between parents' profession and education and their children's innovativeness.

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## 9. APPENDIX

### 9.1 Questions used to determine Exploration

To what extent did you, last year, engage in work related activities that can be characterized as followed:

- 1.) (Ideas about) introducing any new or improved work processes
- 2.) Using an external network to exchange information (e.g. with universities, suppliers, competitors etc.)
- 3.) Focusing on strong renewal of products/services or processes
- 4.) Activities of which the associated yields or costs are currently unclear
- 5.) Activities requiring quite some adaptability of you
- 6.) Activities requiring you to learn new skills or knowledge
- 7.) Activities that are not (yet) clearly existing company policy

### 9.2 Questions used to determine Exploitation

To what extent did you, last year, engage in work related activities that can be characterized as follows:

- 1.) Activities of which a lot of experience has been accumulated by yourself
- 2.) Activities, which you carry out as if it were routine
- 3.) Activities, which serve existing (internal) customers with existing services/products
- 4.) Activities of which it is clear to you how to conduct them
- 5.) Activities primarily focused on achieving short-term goals
- 6.) Activities, which you can properly conduct by using your present knowledge
- 7.) Activities, which clearly fit into existing company policy

### 9.3 Pairwise Comparison

Dependent Variable	Mother with Academic Education	(I) Father with Academic Education	(J) Father with Academic Education	Mean Difference (I-J)	Std. Error	Sig. <sup>b</sup>	90% Confidence Interval for Difference <sup>b</sup>	
							Lower Bound	Upper Bound
Exploration Scale	No Academic Education	No Academic Education	Academic Education	-.371	.319	.249	-.902	.160
		Academic Education	No Academic Education	.371	.319	.249	-.160	.902
	Academic Education	No Academic Education	Academic Education	-.507	.652	.439	-1.592	.579
		Academic Education	No Academic Education	.507	.652	.439	-.579	1.592
Exploitation Scale	No Academic Education	No Academic Education	Academic Education	.198	.244	.420	-.209	.605
		Academic Education	No Academic Education	-.198	.244	.420	-.605	.209
	Academic Education	No Academic Education	Academic Education	-.839 <sup>*</sup>	.499	.097	-1.670	-.008
		Academic Education	No Academic Education	.839 <sup>*</sup>	.499	.097	.008	1.670

Based on estimated marginal means