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The postmodern perfectionist, the pragmatic hedonist and the materialist maximalist: understanding high school students' profile choices towards or away from mathematics, science and technology (MST) fields in the Netherlands

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ABSTRACT

This study focuses on high school students' profile choices and the choice for or against the Nature and Technology (NT) profile in the Netherlands. A mixed-methods approach is used to study cultural values that affect this choice. The quantitative part of the study shows that being female is negatively correlated with the choice for the NT-profile, irrespective of the grade average for mathematics, chemistry and physics. It further shows that students' ethnic background does not have a significant effect on this choice. The qualitative part of the study reveals that students' choice processes towards or away from NT can be categorised in three ideal types: the postmodern perfectionist, the pragmatic hedonist and the materialist maximalist. Gender differences appear to be more pervasive across these types than differences in ethnic background.

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1. Introduction

In recent decades, female participation in higher education has risen sharply, and in most EU and OECD countries more than half of all students in higher education are now female. Yet, the share of women in mathematics, science and technology (MST) fields remains low.¹ This lagging female participation in MST fields is a worldwide phenomenon of concern to many (EC 2010, 2012; OECD 2006a).

The research literature provides different explanations for this gender imbalance in MST (for an overview, see Yazilitas et al. 2013). Explanations at the level of the individual refer to individual student characteristics. An example is the finding that girls' mathematics self-efficacy beliefs – that is, their confidence in their own mathematics abilities and skills – tends to be lower than boys', which would explain why they opt for MST less often (Bandura 1978, 1986; Bussey and Bandura 1999; Lent, Brown, and Hackett 1994). Explanations at the institutional level relate gender differences in study choice to characteristics of the education system. In countries with education systems in which students are given more freedom to choose between alternative trajectories, for example, gender differences

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in study choice are larger than in countries where students have less freedom of choice (Abbiss 2009; Van de Werfhorst, Sullivan, and Cheung 2003; Van Langen, Rekers-Mombarg, and Dekkers 2008). Explanations at the cultural level focus on gender roles and other cultural values. Gender role theory, for example, attributes gendered patterns in MST participation to differential cultural socialisation of men and women, and to the idea that MST fields are associated with more masculine roles (Charles and Bradley 2009; Scantlebury and Baker 2007; Schreiner 2006; Sjøberg and Schreiner 2005). Another cultural explanation relates gendered study patterns to the level of economic development of a society and to concepts of materialism and postmaterialism (Schreiner 2006; Sjøberg and Schreiner 2005).²

Given the vast scientific evidence available, it is now evident that individual, institutional and cultural factors all play a role in explaining study choice, but currently very little is known about the way these factors work together in the actual choices students make.

In this article, we report on a study of choice processes of individual students in upper secondary education in the Netherlands. We focus on the so-called profile choice, a choice that regulates which fields a pupil can enter into in higher education.

At the end of grade 9 (age 14/15), students in upper secondary school in the Netherlands are obliged to choose at least one of four profiles. The four profiles that can be chosen are: Nature and Technology (NT), Nature and Health (NH), Economics and Society (ES) and Culture and Society (CS).³ In an effort to gain a better understanding of gendered patterns of choice in MST, this study focusses on high school students' choices for or against the NT-profile.

With respect to this NT-profile choice, the Netherlands presents a paradoxical picture. The gender imbalance in MST fields is large in comparison to other EU and OECD countries. Recent figures by Eurostat show that 22.6% of all students in mathematics, science and computing fields in the Netherlands are female, as opposed to 37.3% on average across the EU (Eurostat 2012). This fact, however, seems to contradict several other facts on gender equality in the Netherlands. First, the Netherlands scores relatively high on gender equality in education and also in economic and political participation. According to the most recent Global Gender Gap Index, it ranks 14th of 142 countries in equality (World Economic Forum 2014). Second, in comparison to female students in other OECD countries, Dutch female students score relatively highly in mathematics skills as measured in the Programme for International Student Assessment 2012 (OECD 2014). Moreover, the gender gap in achievement scores is relatively small in the Netherlands in comparison to other OECD countries (OECD 2014).

In this study, we focus on understanding this paradox. The research question we want to answer is: To what extent and in what way do male and female students in the Netherlands differ in their profile choice patterns, and how can we explain these differences?

We will now first discuss the theory underlying our study. Next, we discuss the design of the study and present the results and we end with a conclusion and debate of our findings.

2. Theory

The unequal representation of female students in MST used to be attributed to a presumed lesser aptitude for these subjects, but it is obvious now from a vast body of research

literature that this explanation does not hold (Yazilitas et al. 2013). Still, girls more often than boys believe that they have no talent for MST (for an overview see Singh et al. 2007). Furthermore, it is found that girls more often than boys prefer other subjects over MST and this is reflected in their expectations with regard to future fields of study and occupations (Baram-Tsabari et al. 2006, 2009; Christidou 2011; Jenkins and Pell 2006). These expectations are reinforced by their parents, as parents too tend to support the cultural stereotype that mathematics is more natural for boys (Eccles et al. 2000; Furnham, Reeves, and Budhani 2002; Li 1999).

Cross-national studies have also shown that the institutional school contexts in which children are educated have a strong influence on values, norms and beliefs that are associated with study choice (Crul and Heering 2008; Eccles 2005; Levels, Dronkers, and Kraaykamp 2008; OECD 2006b, 2007). School systems which are highly differentiated, that is, track students from an early age into different streams and levels, tend to produce more gender inequality than countries with less differentiated systems (Bradley and Charles 2004; Charles 2011; Van Elk, Van der Steeg and Webbink 2009, 2011; Van Langen, Rekers-Mombarg, and Dekkers 2008; Wößmann 2009). Other research findings also show that in countries where pupils are given more freedom to choose between alternative trajectories, patterns of educational choice are found to be more gendered (Abbiss 2009; Van de Werfhorst, Sullivan, and Cheung 2003; Van Langen and Dekkers 2005; Van Langen, Rekers-Mombarg, and Dekkers 2008; for a more detailed description of these findings, see also Yazilitas et al. 2013).

In explaining gender roles and gendered patterns of academic choice, socialisation theory has traditionally argued that inequalities within the education system and the labour market would cease to exist with the progression of women's right over time. This idea is now abandoned by most sociologists because increases in gender equality have not yielded more equal representations of women in male-dominated fields as MST or related professions (Charles and Bradley 2009; Scantlebury and Baker 2007). The relationship between societal development, gendered identities and gendered choice patterns instead presents a puzzling picture, in which female participation in MST is actually higher in societies with more traditional gender roles than in societies with more egalitarian roles (Charles and Bradley 2009).

It is suspected that this positive relationship between sex segregation in MST and egalitarian gender roles is related to socioeconomic modernisation. Inspired by Inglehart's modernisation theory (1997; Inglehart and Norris 2003; Inglehart and Welzel 2005), Sjøberg and Schreiner (2005; Schreiner 2006) relate sex-specific study choice to economic development. In economically more developed or postmodern societies, an individual's identity is no longer perceived as something that is given, but rather as something that one has to choose and develop (Giddens 1991). Modernism thus refers to a value system in which material security and the desire to fulfil material needs stand central, whereas postmodernism refers to a value system which emphasises the desire and fulfilment of other types of needs, including intellectual fulfilment, autonomy and self-expression. Postmodernists attach much value to living in accordance with their own values. They prefer jobs which are intrinsically fulfilling, rather than jobs that just provide material security and stability. In this context, students in postmodernist societies are believed to make fundamentally different educational choices than students in traditional and modernist societies (Illeris 2003; Schreiner 2006; Sjøberg and Schreiner 2005).

Following this cultural explanation, women in postmodernist societies, when offered the choice between different alternatives in higher education, will tend to be heavily influenced by their gender roles, and therefore will typically choose female fields of study, which are more connected with their core identity. Women in less developed societies seem less concerned with these identity issues and more often choose to study in non-traditional fields, including MST, because their choices are more driven by modernist values, like a concern for material security and stability. Although the same explanatory mechanism also applies to men and their educational choices, Schreiner and Sjøberg argue that the difference in academic choices in different societies is nonetheless smaller, because men's core identities and gender roles are much less contested in other academic fields than women's in MST. Research by Charles and Bradley (2009) on sex segregation by field of study in higher education across 44 societies, including both developed, developing and transitional countries, shows that sex typing of MST is indeed stronger in more economically developed contexts. We may expect therefore that not only male and female students make different choices, but also that students whose families originate from economically less developed societies, that is, students with an immigrant background from these societies, will choose differently from native students in more developed country contexts.⁴

Despite this knowledge of various determinants operating at different levels, it is still not understood how they work together to create gendered study choice patterns in MST. In this study, we aim to shed more light on how high school students' choices towards or away from MST fields come about. We focus in particular on cultural factors, that is, students' ideas about the choice for or against the NT-profile, and relate this to their self-identity and values. It is for this reason that in a comparison of male and female study choices, attention is also given to migration background.

Based on Schreiner and Sjøberg, we hypothesise that girls with a native Dutch background will be less likely to opt for MST, not only compared to native Dutch boys, but also compared to both boys and girls with a non-Western background. This is because MST seems to correspond less with female identities in Dutch society, and also because late- and postmodern identities lead them to more gender-essentialist study choices.

3. Research design

To investigate the hypothesised relationship between gender, ethnic background and the choice for or against MST, we decided to focus our study on the so-called profile choice ('profielkeuze') in Dutch preparatory scientific education ('Voorbereidend Wetenschappelijk Onderwijs' or 'VWO'). VWO is the most common route to higher education in the Netherlands. At the end of grade 9, VWO students are required to choose at least one of the following four profiles:

- Nature and Technology (NT),
- Nature and Health (NH),
- Economics and Society (ES) and/or
- Culture and Society (CS).

We further decided to study the influence of gender and ethnic background through mixed-methods research, in which we tried to establish not only the quantitative statistical relationship between these variables, but also the study choice processes themselves and the rationales for the students themselves gave for their choices.

3.1. Place of research and research period

The research was conducted in two VWO schools with a student population that was mixed in gender and ethnicity, in a medium-sized city in the North-West of the Netherlands. The city in question has been anonymised for the protection of students' privacy. The data collection, both qualitative and quantitative, took place in the period January–April 2012.

3.2. Quantitative data collection and analysis

The quantitative part of the research focused on exploring the statistical relationships between profile choice (dependent variable) and gender and ethnic background (independent variables). For this purpose, we collected these data on 259 students in grade 9 and grade 12, with the help of the central administration offices of both schools.

In accordance with the Centraal Bureau voor de Statistiek (Statistics Netherlands) definitions, students were classified as having a native Dutch, a Western migrant background or a non-Western migrant background (see note 4). A non-Western migrant background meant that at least one of the student's parents was born in a non-Western country. Of the 259 students, 169 students (65%) were classified as having a native Dutch background, 57 students as having a non-Western migrant background (22%) and 34 students as having a Western migrant background (13%).

As the profile choice was also likely to be influenced by previous study results, the grade point averages for both natural sciences in short 'Average Grade Sciences' (AGS) and languages in short 'Average Grade Languages' (AGL), on the report cards at the end of grade 9, were included in the data collection.

3.3. Collection and analysis of qualitative data

The second phase of the study consisted of qualitative research in the form of semi-structured interviews with students in grade 10 (age group 14/15) and 12 (age group 17/18). This was to understand the actual choice processes students experience, when opting for or against the NT-profile. The main criteria for selecting students to interview was that students had to be able to choose the NT-profile on the basis of their grade averages in grade 9 (schools typically set a lower limit for those grades, especially in relation to physics and advanced mathematics B, below which a student is not allowed to choose the NT-profile). Forty-four interviews were held in this initial stage with students who fulfilled this criterion. In doing so, we tried to balance the number of male and female students. However, the total number of interviews was not decided beforehand and the main researcher continued to do interviews until the saturation point was reached where additional interviews did not provide new information or insights (Glaser and Strauss 1967). Another six interviews with students from two schools in another middle-

sized city were added to the main analysis because there were not enough students with a non-Western migrant background in the original sample to justify a comparison between the two groups. In total, we interviewed 32 female students (64%) and 18 male students (36%). Of these students, 33 were of native Dutch background (66%), whereas 17 students had a non-Western migrant background (34%). Prospective interviewees were identified through study counsellors at the two schools and through acquaintances in the case of the interviews held in the second city. Interviews were conducted in various settings, often at the interviewee's school and audio recorded with consent from the interviewee.

Interviews followed a semi-structured scheme for which a topic list was compiled based on an earlier literature study (Yazilintas et al. 2013). The interviewer started with a short explanation about the research and her role as researcher. This was followed by asking what profile the interviewee had chosen at the end of grade 9 and why. Next, questions relating to self-efficacy beliefs and role models followed, including asking the interviewees about the opinions of their parents, siblings, peers, teacher and school mentors and their influence on their choice. Interviewees were also asked about the timing of the choice and their expectations with regard to future fields of study and occupations. If students did not mention a NT-profile or MST fields as possible fields of study, the interviewer explicitly asked how they thought about this profile and fields and why they did not choose it.

The interviews were first transcribed. We then read through the first couple of interviews and searched for themes related to the topic list and research question. At the same time, we performed open coding when new themes emerged from the material and also wrote extensive memos in an effort to interpret the data more thoroughly (cf. Erlandsson et al. 1993; Glaser and Strauss 1967). In order to ensure that the codes were transparent and well defined, the interviews were encoded independently by two different authors. We then re-read the interviews in relation to one another and re-grouped the codes and themes by creating new codes, themes and memos or combining them when they seemed to overlap. We repeated these steps several times when adding new interviews to the analysis (cf. Glaser and Strauss 1967 on 'constant comparison' and Corbin and Strauss 2014 on 'axial coding'). After the first 15 interviews, we made a first analysis by writing down overarching themes and discussing them with one another. We then added more interviews and repeated this last step several times, going back and forth between the interviews, codes, memos and themes. After having analysed 35 interviews, three clear patterns emerged. During the analysis, we did not group the interviews by gender or ethnicity. The groups that eventually emerged are reflective of the patterns we discovered when analysing the interviews.

4. Findings of the quantitative research

The quantitative part of the research resulted first of all in a numeric overview of the distribution of profile choices for male and female students, and for students with a Western and a non-Western ethnic background (Table 1). With respect to gender, an unexpected finding was that the percentage of female students with NT in their profile was not as low as initially expected, namely 42% against 59% for male students. As the table shows, however, female students chose NT almost exclusively in combination with the NH-profile and only 3% of female students chose the NT-profile in its pure form. This in contrast to the male students of whom over 20% selected NT as a single profile. As a

Table 1. Profile choice by gender and by ethnic background ($N = 259$).

Profile	Gender		Ethnic background		Total
	Male	Female	Western	Non-Western	
NT only	27 20.5%	4 3.1%	27 13.4%	4 7.0%	31 12.0%
NT & NH combined	51 38.6%	49 38.6%	72 35.6%	28 49.1%	100 38.6%
Other	54 40.9%	74 58.3%	103 51.0%	25 43.9%	128 49.4%
Total	132 100.0%	127 100.0%	202 100.0%	57 100.0%	259 100.0%
Significance (χ^2)	0.000		0.132		

result, we established a significant difference in the distribution of profile choices with respect to gender ($p < .000$).

With respect to the ethnic background, no significant difference in profile choice could be established ($p = .132$).

Table 2 further explores this relationship between profile choice, gender and ethnic background and also the average grades for both sciences and languages. As this table shows, the choice for NT as a single profile is not only correlated with gender, but also with the grade point average for sciences at the end of grade 9. The choice for the combination of the NT & NH, however, shows no correlation with gender, but a significant positive correlation with the grade point averages for both science and languages. In other words, this NT & NH combination seems to attract the better students with broader talents than just sciences.

Finally, Figure 1 provides a graphical representation of the relationship between opting for NT, either as a single profile or in combination with NH, for different grade point averages for sciences. Although, given the limited sample size, this graph should be interpreted with care, the figure shows again that girls seldom opt for the pure NT-profile, and that they tend to attach NT to the NH-profile when their grade point average for sciences is higher. Boys, on the other hand, seem to have a more specific interest in NT in its pure form, and also tend to opt for the NT and NH combination at a somewhat lower grade point average for sciences.

Table 2. Bivariate correlations between profile choice, gender, ethnic background and grade averages ($N = 259$).

	NT	NT & NH	Female	Non-Western	AGS	AGL
NT as a single profile ($y = 1$)	1	-0.292**	-0.267***	-0.081	0.168**	-0.058
NT & NH combined ($y = 1$)	-0.292**	1	-0.001	0.115	0.342**	0.190**
Female ($y = 1$)	-0.267***	-0.001	1	0.057	-0.098	0.196**
Non-Western background ($y = 1$)	-0.081	0.151	0.057	1	0.012	0.004
Average grade sciences	0.168**	0.342***	-0.098	0.012	1	0.511***
Average grade languages	-0.058	0.190**	0.196**	0.004	0.511***	1

* $p \leq .05$.

** $p \leq .01$.

*** $p \leq .001$.

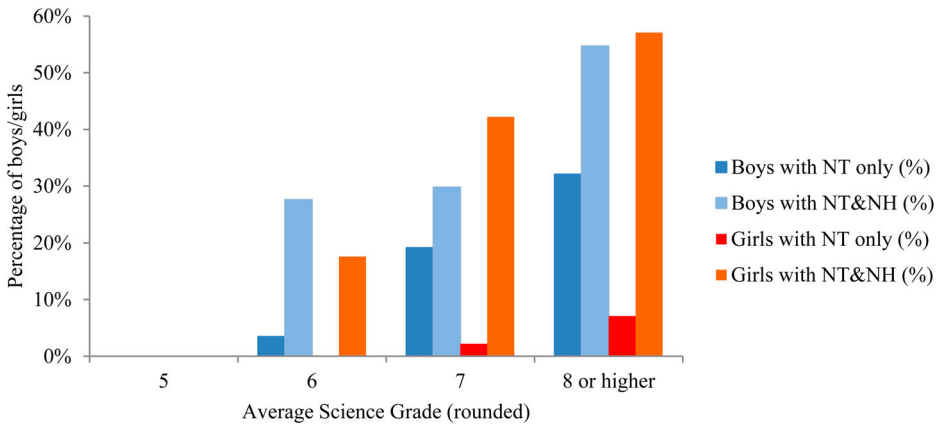


Figure 1. Percentages of male and female students who chose NT (as a single profile or in combination with NH) for different grade point averages for sciences on their report cards ($n = 259$).

5. Results of the qualitative study

While the results of the quantitative analysis provided answers about the statistical relationships between the variables under study, they also left us with some puzzles. Most importantly, why did these female VWO students take the NT-profile almost exclusively in combination with NH, whereas for their male colleagues this combination was clearly less dominant?

The answer to this question was found in the qualitative study, which revealed three ideal types of study choice behaviour.

5.1. Ideal types of study choice behaviour

After analysis of the interviews, we were able to distinguish three main ideal types of students, which we labelled: the postmodern perfectionist, the pragmatic hedonist and the materialist maximalist. Of course, not all students fit fully into one single category, since each category concerns an abstraction and simplification of reality.⁵ There were no students who fell outside the three ideal types, although some students shared features of two ideal types. In such cases, we had to decide which one they most closely matched. We will describe the three ideal types by focusing on three individual students, each one exemplifying one type most closely. In addition to these three, we include quotes from other students to present a more fleshed out story.

5.1.1. The postmodern perfectionist

The postmodern perfectionist is typically a female native Dutch student who is somewhat obsessed with making the 'right' choices that fit well with her unique personality. A personality that is very much geared towards self-realisation and development, that is, becoming the best version of yourself. One important result of this obsession is that she is in constant doubt about her choices. The postmodern perfectionist will try to choose as broadly as possible in order to keep her options open. She is typically also

someone who is not easily satisfied with less than 'perfect' grades, worries a lot about being not good enough at school, and spends a lot of time on homework.

Sarah, 16-year-old student, is considered to be a prototypical student with the NT and NH combination profile, with economics as her free-choice subject and management and organisation as an additional extra-curricular subject ('verbreidingsvak') in grade 10 (sophomore) of gymnasium. Asked about why she chose this particular combination of profiles and subjects, Sarah answers that this is mainly because at the time of her choice she wanted to study pharmacology but was also considering becoming a chartered accountant. She hesitated for a long time between the different profiles. The choice she eventually made covers almost three profiles. So Sarah actually chose not to choose by combining three out of four profiles available to her. This seems to go against the concept of profile choice in the Dutch education system, but for Sarah it was a strategic move to limit the risk of making a wrong choice.

Jessica, another student who typifies the postmodern perfectionist, echoes this idea in her account of her profile choice:

Well, I didn't exactly know what I wanted to do, I thought maybe something in the direction of economics or so but I liked medicine, (...) something with technology or with health. So, yes, I didn't know yet, so I thought I would take the broadest profile.

Similarly, Janna says that though it was very clear for her that she wanted to study biology, and therefore also had to choose combination of NT & NH, this did not preclude her from doubting a lot about her free subject choice to add to her profile:

I thought for a very long time about my free subject choice, ... because I was doubting a lot between multiple subjects. I wanted to maybe still do economics or M&O. We also had economics in grade 9 and I was just not very good at it, but I still thought it was a very useful subject, so I was like ... and I also wanted to something creative.

Eventually, Janna choose to add music to her profile but now regrets her choice since she noticed that she was not 'on the same level as the rest of her class, and also lacked singing skills, something which students also had to do'. She therefore decided to follow drawing lessons as well.

Sarah, Jessica and Janna thus all try to avoid making the wrong choices, by putting off these choices as long as possible or by combining as many options as possible. This is not so much because they are afraid that if they make the wrong choice they will not find a job, but because they are anxious to choose a job that will make them happy. Correspondingly, for Hilde, who wants to become a doctor, her career orientation is mainly based on the expected fit between her personality and the type of work that she expects to do later:

The type of work has to appeal to you, it needs to suit *you* [*emphasis added*] because a study field might appeal to you but if you don't like the type of work, you actually studied for nothing, then you still end up doing something that you don't like. So for me, I looked for something that appealed to me personally.

The emphasis on choosing something that personally appeals to you and through which you can further develop or realise yourself is exemplary of postmodern perfectionist. About her goal in life Sarah, for example, says:

Sometimes you see people being very happy with their choice and that's also what I strive for, being happy with my own choice.

This means, however, that Sarah has to know what choice makes her happy, and this she does not know yet. Given her desire not to close off any options it comes as no surprise when she says:

I want to achieve as high as possible grades.

Sarah mentions that she spends 'four, maybe five hours per day on doing her homework', on a daily basis. She adds to this:

... but I am also a little bit of a perfectionist.

Similar personal traits are expressed by other students in this type. Marian, for example, says that she 'is only content with a grade when it is 8/10' and that she is 'very strict with herself' in meeting this threshold. Like Sarah, she relates this to:

... perhaps being extremely perfectionist.

Or as Emma, yet another student puts it:

I am just somebody who wants to do everything.

For Sarah, this attitude towards homework is also linked to wanting to meet the expectations of teachers. Other students confirm that teachers have high expectations of them. Charlotte, for example, says that teachers expect students 'to put a lot of effort into school-work' and obtain 'straight A's'. Teachers also think in terms of a hierarchy of profiles. This becomes clear in Emma's story of her teacher's reaction to her profile choice:

Well, take Mark for example, he teaches natural science subjects here, he said something like: 'A Nature and Technology-profile really fits you well, you are really a N-student'. He always talks about N-students; they have to have something extra. I think that is such nonsense ... That is how it is here at school, a Nature and Technology-profile is considered to be the highest profile, and then comes Nature and Health, followed by Economics and Society and then comes Culture and Society.

Hence, a perfectionist's choice will include NT because NT is top.

Sarah admits that she finds it hard to navigate between her own expectations and those of others. Her parents want her to choose 'a field in which there will be a lot of jobs available in the future' and to some extent she agrees with them but she also wants to choose a field that she finds interesting and can enjoy. Moreover, Sarah expects to be married and have children when she is about 30. Therefore, it must also be a job she can combine with family-life, which offers enough free time and regular working hours. While Sarah is an excellent student, school life for her is fraught with anxiety and stress.

For young women like Sarah, their postmodernist outlook is a troubled one. The many choices they are offered are a burden. They are not just eager, but anxious to make a choice that fits with their personality. While they believe that their choices are reflective of their individual personality, they are clearly also informed by what others expect of them and by their own expectation that they will become mothers. The responsibility

of choosing an education and career that fit their personalities is experienced as a heavy burden, and leads to a strategy of keeping options open and obtaining high grades.

5.1.2. *The pragmatic hedonist*

The pragmatic hedonist typically is a male native Dutch student who wants a job that is interesting and offers reasonable financial prospects. As a strategy, he will choose those options that he thinks combine the best of these two. He is also keen on reaching his goal through minimal effort. In comparison to the postmodern perfectionist, he is less worried about expectations of others and less concerned with keeping options open.

Jasper is a 16-year-old male student in grade 10 (sophomore) of gymnasium. He has a combination of the NT and ES profiles. Jasper's approach to homework is pragmatic. He does what is needed to get good grades:

I learned that you can do quite a lot at school, if you plan it well. I do set my priorities, what I do and what I don't do.

About his profile choice, he explains:

[...] I think that it gives me the most chances for a good profession and I chose for advanced mathematics because I could eventually study econometrics, or something along that way.

Jasper later adds:

I also like physics but I really wouldn't like to have a profession in natural sciences ['beta'] later.

He associates a career in natural sciences with 'working on things like dykes or building bridges' and emphasises that this is 'not his passion'. For Jasper, his parents are a kind of personal consultants that he can call upon when necessary. He feels that they leave him free to make his personal choices. Pragmatic hedonists like Jasper seem to be more intrinsically motivated in making their choices, emphasising the importance of following your interests instead of keeping options open. This is also confirmed by other students in this category. Fatih, for example, says that his interest in physics, chemistry and mathematics was the most important reason for choosing the NT-profile and explains that:

When [a subject] doesn't interest me, then I won't put any effort into it' [...] If I find something interesting, I just put a lot of time and effort into it, not by force or anything but just because it automatically happens.

For Tobias, the extent to which you enjoy a subject is also intrinsically linked to how easy you find that subject, therefore:

[Y]ou tend to choose subjects that you find easy, because naturally you also enjoy those more.

What matters to Jasper is not only subject content:

I want fun colleagues ... and my feeling just tells me that there are more fun people in business than in a laboratory.

Jasper also wants a good income. When we ask Jasper to consider what is more important for him: working with nice people or earning a lot of money, he says:

If you studied something like business administration you won't earn badly in any case – usually it's between 2500 and 3000 euros net, something like that – I would value a nice

working place higher. I don't want to work myself to death to become rich either, that's not what I want.

This idea that work should be 'fun' and at the same time 'well-paying' also resonates in other students' stories. Lars, for example, says:

[When I think of my future job] the most important thing is that it's fun. Look, if you don't think your work is fun then you won't feel good in your day-to-day life. I will probably be working almost 40 hours a week. Then, it needs to be something you enjoy. ... I also think it should pay reasonably You should also be able to live comfortably from your earnings, be able to buy the things you want.

Similarly, explains that in a future job or occupation, it is important that:

That you have a fun job and that you are not bored. That you enjoy going to work, and not feel forced to go to work on a daily basis.

He later explains that money is also important for him, much more important than status, for example. Comparing the importance of status and money, he says:

Status no. Money yes. Status is not relevant because when your job has a low status but still earn good money, than you are set.

Often the idea that work should be both fun and well-paying is implicitly assumed by students in this type. The following quote from Willem illustrates this:

For me a job should be on the right [high] level, otherwise I will get bored easily and do nothing. [...] Money is not really important. I assume that, given the fact you will also have a university degree, in any case you won't end up in the lower salary scales.

These students' future expectations are focused on work. When Jasper is asked what he expects his life to look like when he is about 30 or 40 years old, he answers, without too much enthusiasm:

I presume a family maybe.

Young men like Jasper combine a hedonistic outlook – fun comes before earnings – with a desire for security. They want fun in life and an interesting job, but it should also be a steady job with a good income. They are willing to work, but do no more than is necessary to reach their goals. This ambition and pragmatic strategy guide their educational choices. Concerns about combining work and care are absent.

5.1.3 *The materialist maximalist*

Finally, a third category of students, consisting mainly of male and female students of non-Western migrant background, and some native Dutch students, may be typified as a modern or materialist maximalist. These students are concerned with choosing options that grant them high social status and material wealth and security. As a result, they prioritise study and career choices that combine these two aspects most.

Ayla is an 18-year-old with a non-Western background and has chosen the NH-profile, including advanced mathematics B and physics and French as her free-choice subjects. By choosing advanced mathematics in combination with physics, biology and chemistry, Ayla

actually has a double profile consisting of NT and NH. Ayla was initially hesitating between ES and CS but then thought:

‘CS, that’s nothing compared to ES or NH. I am attending gymnasium, I am a clever girl. I want more status you see’. Later she adds: ‘Smart people do NT and NH. That is generally known’.

Her initial interest in ES was because she considered becoming a judge or work in business. A visit to a career fair convinced her of her interest in health related fields: ‘So I choose NH. [...] I now want to study dentistry.’ This is also because she considers herself a person who wants to socialise with people and who is practical and good at technical things.

As we have seen earlier, occupational expectations are fundamental in understanding choice patterns towards or away from MST fields for all students. However, in contrast to the two other cases, the preference for high status occupations is much more overt in the motivations of students of this type. Ayla says that status matters to her. When asked why, she answers:

‘Well, for example, you are in a plane and somebody gets a heart-attack, then you, as a doctor, well, you can help. You know, not everyone can do that. With medicine and dentistry, your name is even different after studying that [she is referring to the title of medical doctor]’. She continues: ‘And you also make piles of money. [...] Money does make you happy. Money is everything these days. Nobody can convince me that money doesn’t make you happy’.

Ayla explains her choice to study dentistry instead of medicine:

After 6 years of medicine, you still are nothing while – yes of course you will have a diploma, but you can’t really work, you need to specialize – while with dentistry, [...] after 6 years you can really work as a dentist. [And] with medicine [...] you have to know a lot of different parts of the body, I think that is much more difficult. While I only have this part [shows head area], plus mouth and teeth of course. That’s much more easy.

Hence, material maximalists are like the pragmatic hedonists calculators, but what goes into the calculus is different. Dentistry is a numerus fixus study that works with selection by drawing lots. It is a weighted lottery: higher grades increase one’s chances. This puts pressure on her to have high grades. Therefore, Ayla is anxious about the exam, not because, as she adds, she has fear of failure. The anxious attitude of the postmodern perfectionist is clearly not hers. If we ask her what she would do if she eventually did not get in, Ayla says:

No, I really want to commit suicide if I don’t get ... I really want to study dentistry so badly. It really is a dream.

Students who fall in this ideal type emphasise the importance of job security, high income and status much more, than the students in the other two categories. They do not talk about autonomy, having fun or following one’s passion. In particular, students of non-Western background get a clear message from their parents. Fatima explains:

[They] never had a choice. (...) They work as blue collar workers and that is very hard, they say. And then they also say: ‘You have to have it easy. You have to work very hard now, so that you can have an easy life later on’. [...] According to them, the best thing to do is to end up as high as possible, so that I can live a very easy life.

Most students with a migrant background have parents who have no knowledge about academic disciplines or careers. Other students' descriptions show that parents of non-Western migrant background have a more limited knowledge of the Dutch higher education system and professional labour market than parents of native Dutch students. This unfamiliarity with alternative educational and occupational trajectories also applies to most students with a native Dutch background within this type, albeit to a much lesser extent, due to larger social networks and more advanced Dutch language skills. Rick for instance says: 'None of my parents had university education. So they don't have any first-hand experience with higher education. Instead they obtained a lot of information from internet and from acquaintances who did enjoy a university education, or from their children.' Like Ayla, Rick also talks extensively about the importance of wealth and status:

I have searched very actively for professions and things that seemed interesting. And I have always been very interested in – I realize that this sounds really corny but – people who have made it.

Although they speak the same language of freedom of choice, happiness and personal responsibility, the students in this category have a materialistic value orientation and are status-minded. For the immigrant students, their parents appear to have a much larger influence on their choices than the parents of native Dutch students. They primarily want their children to make educational choices that lead to jobs with high income and high status. This is what guides this group of students.

5.2. Genderedness of ideal types

Each of these ideal types represents the choice processes of a particular group of students. Based on the characteristics of each ideal type, we categorised students according to the ideal type they matched most closely. Table 3 presents an overview of the interviewees by ideal type, gender and ethnic background. When we look at the distribution of male and female students within each type, we see that female students are clearly overrepresented in type I, whereas within the second type, the gender balance is in the favour of men. Within the third type, the balance is slightly in favour of female although it is more even than in the other two types. In relation to background, native students are

Table 3. Overview of interviewees by ideal type, gender and background ($N = 50$).

Ideal type	Gender	Ethnic background			Total
		Western	Non-Western		
Type I – postmodern perfectionist	Male	1 (6%)	0 (0%)	1 (6%)	
	Female	12 (66%)	5 (28%)	17 (94%)	
Type II – pragmatic hedonist	Male	13 (72%)	5 (28%)	18 (100%)	
	Female	7 (35%)	1 (5%)	8 (40%)	
Type III – materialist maximalist	Male	17 (85%)	3 (15%)	20 (100%)	
	Female	2 (17%)	3 (25%)	5 (42%)	
Total	Male	1 (8%)	6 (50%)	7 (36%)	
	Female	3 (25%)	9 (75%)	12 (100%)	
Total	Male	13 (26%)	5 (10%)	18 (36%)	
	Female	20 (40%)	12 (24%)	32 (64%)	
		33 (66%)	17 (34%)	50 (100%)	

overrepresented within the first. This applies even more so to the second type. However, students of non-Western descent are overrepresented in the third type.

6. Conclusion and debate

This study started from the observation few girls opt for an educational career in the field of MST, in the Netherlands. To understand why this is the case, we focused our study on the profile choice that VWO students have to make, based on the assumption that this profile choice constitutes an important and crucial step in the trajectory towards MST in higher education. Our research results provided some unexpected insights, which we will now discuss.

Perhaps the most surprising insight we gained is that although girls much less often opt for MST fields in higher education, this does not show from their profile choice(s) in grade 10. Girls very frequently choose the NT-profile and in doing so they do not differ that much from boys (42% as opposed to 59%). A difference that remains, however, is that boys more often chose the NT-profile without combining it with the NH-profile than girls (21% as opposed to 3% exclusive NT choosers). In other words, the overwhelming majority of the girls in our schools with the NT-profile combine this profile with the NH-profile.

In accordance with the genderedness of the ideal types, we found in our interviews that most of the postmodern perfectionists, the native Dutch girls in particular, are hardly motivated for NT, but still opt for it. These girls are anxious to make a choice that best fits with their personality, yet are insecure about what they want and therefore want to keep their options open. They do this by working hard to get high grades and to combine profiles. A combined NH/NT-profile gives access to all fields of study they may want to do in the future. The real interests of these postmodern perfectionists seems to be in health- and medicine-related subjects, such as biology, and several health and medicine studies require physics and advanced mathematics. Hence, these girls want the NT-profile to be able to qualify for these studies. Moreover, for many of these fields there is a considerable probability of not getting in because of the *numerus fixus*, which also leads to a second instrumental reason to choose the NT-profile: to keep all options open in case a first option gets blocked. Hence, not their inner motivation, but the fear of prematurely closing off options and the institutional context of the Dutch education system explain why these girls choose the NT-profile.

The results of our qualitative research further suggest that male students who are capable of doing the NT-profile, native Dutch in particular, in general choose this profile because they think they can manage this profile; they think that it fits their personality, and that it allows them to choose a study that leads to an interesting and well-paying job.

Regarding ethnic background, our quantitative results suggested that students' background did not have an effect on the choice in favour or against the NT-profile, which was contrary to what we expected. However, based on our qualitative research, this conclusion may be unwarranted. Although, on the face of it, immigrant students seem to make the same choices, their choices are driven by different values. The NT-profile, which in the current Dutch institutional context seems to be perceived by students as the highest status profile, was equally preferred by native Dutch students and by students with a migrant background. Students with a migrant background typically had parents with little education who held less prestigious jobs. They opted for the NT-profile,

because they wanted to make their parents proud and to obtain high status jobs and secure material prosperity, while native Dutch female students choose the NT-profile because they were afraid to miss out on future opportunities and wanted to keep all options open.

In this study, we empirically tested Schreiner and Sjøberg's theory in the case of Dutch upper secondary school level students' choice for or against the NT-profile. Schreiner and Sjøberg's theory is only partially supported by our study. Based on this theory, we expected female students and students of native Dutch background to feel less positive about choosing the NT-profile than male students and students of non-Western migrant background. The expectation that female students feel less positive about the NT-profile than male students is confirmed in this study, although not as strongly as we expected, since far more female students choose the NT-profile than enrolment figures in MST fields suggest. Secondly, our expectation that native students are driven by post-modern values and therefore feel less positive about the NT-profile than students of a migrant background has not clearly been confirmed in this study. In line with Schreiner and Sjøberg's educational modernisation theory, we indeed found that students with a non-Western background were indeed driven to a somewhat greater extent by considerations of status and wealth, but the difference was not that striking. Also, the majority of students in our sample with a Western background expressed concerns about the future in terms of student financial aid, job security and income. We believe that this outcome is related to the period in which the data were collected, almost 4 years after the financial crisis started in the Netherlands (in 2008). Importantly, this particular outcome runs contrary to Schreiner and Sjøberg's theory as well as the underlying assumption in Inglehart's theory on postmodernity that shift in cultural values from materialist to postmodern is a linear process. Our findings suggest that a re-shift in values is possible in case of cultural, political or economic disruptions similar to the recent financial crisis.

In order to confirm this, however, longitudinal research among larger samples of students is necessary in which students' cultural values; that is, postmodern and materialist values in relation to their school choices are examined over a longer period of time and in different phases of students' school careers. Moreover, comparisons between various cultural and institutional contexts, for example, countries with different education systems, would be necessary in order to gain a better understanding of how factors at various levels come together in explaining changes in gendered patterns of study choice over time.

Finally, while the starting point for our study was the unequal representation of male and female students in MST fields in higher education, the quantitative part of the study suggests that gender differences in students' choice for MST fields are a thing of the past in the Netherlands since girls do not differ that much from boys in choosing a NT-profile. However, the qualitative study and typology, in particular, suggests that this conclusion is too premature. Postmodern perfectionists – who are largely comprised of girls – do not choose an NT-profile out of intrinsic motivation, but because of a fear of prematurely closing off options in the institutional context of the Dutch education system. The typologies found in this study therefore also bear important policy implications for addressing the issue of gender inequality in MST fields in Netherlands. Importantly, policy efforts to address the gender imbalance in MST fields need to take into account the underlying reasons for postmodern perfectionists' lack of intrinsic motivation for

MST fields. The results of this study suggest that this lack of motivation is related to more negative perceptions of MST fields in terms of postmodern perfections' expectations – among others – of how well MST fields match with their core identities, their future job prospects and their life expectations.

Disclosure statement

No potential conflict of interest was reported by the authors.

Notes

1. In this article MST fields generally refers to the total share of students in science, mathematics, computing engineering, manufacture and construction on the International Standard Classification of Education (ISCED) levels 5 and 6 as defined and applied by Eurostat. For a full list of fields that fall under the definition of MST at this level, see <http://ec.europa.eu/eurostat/tgm/web/table/description.jsp>.
2. Schreiner and Sjoberg, use the terms 'Western', 'developed', 'modern', 'modernized' and 'late-modern' as synonyms in reference to cultural, economic and political development in Western societies.
3. For a more elaborate description of the Dutch secondary school system and the profiles, see Eurydice's Eurypedia country report on the Netherlands: https://webgate.ec.europa.eu/fpfis/mwikis/eurydice/index.php/Netherlands:Teaching_and_Learning_in_General_Upper_Secondary_Education.
4. Reports from the Netherlands Institute for Social Research, including 'Dichter bij elkaar' (Huijnk and Dagevos 2012) and Huijnk et al. (2010) show that second generation non-Western allochtones in the Netherlands still differ in their value orientation from the autochthonous.
5. The typology approach is therefore naturally limited in scope. However, its strength lies in its ability to describe social phenomena on specific dimensions and to group together cases that share the same dimensions without necessarily providing an in-depth and separate analysis for each case.

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