Predicting Active Heritage Language Use: The Case of Moroccan-Dutch and English-Dutch Bilingual Children

By
Anna Drukker
1011482

Supervisor: Dr. Sharon Unsworth
Second reader: Dr. Eva Knopp
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Abstract

This thesis investigates which factors have an influence on the active HL use of two groups of bilingual children (Moroccan-Dutch and English-Dutch) aged 4 to 7. Previous research has found the variables: *Siblings, Family constellation, Parental proficiency, Input richness*, and *Length of exposure,* to be influential to HL development. Research that combines them and investigates HL use instead of HL development is lacking. The aim of this study was to investigate the influence of the combination of these factors on HL use. Data was gathered in previous research using the BiLEC questionnaire. The data was analysed using hierarchical linear regression analysis. The results show that HL use is influenced by different factors in the two bilingual groups. For the Moroccan-Dutch bilinguals, *Age* and *Dutch input* (both control variables) were found to be predictive of HL use. For the English-Dutch bilingual *Richness* and *Family constellation* showed to be predictive of HL use. *Siblings* and *Length of exposure* failed to provide significant results. The findings of the factor *Parental proficiency* remained inconclusive and promote further research.

Chapter 1. Introduction

Research on child bilingualism has often focused on the acquisition and further development of a school language, but while this is important to investigate, the study of the development of the heritage language (HL; an explanation for the choice of the term HL can be found at the beginning of chapter 2) of bilingual children must not be overlooked.

Many parents raising bilingual children would probably agree that their children do not always use the languages they planned their children to use, or in the way they had planned. For example, children might be raised in a household where two languages are spoken. One of the parents speaks the majority language (i.e. the societal language) and the other parent speaks the HL, thereby aiming for their child to speak both languages equally well. However, it might be the case that the child decides to only speak the majority language, while completely disregarding the HL. In this example it might become quite frustrating for parents who are actively trying to get their child to speak the HL. In addition to the emotional importance, as actively speaking a HL has been linked to positive family well-being (Müller et al., 2020; Tannenbaum & Howie, 2002), the HL is also from a linguistic point of view. It has been found that a strong L1 is a necessity for successfully developing a L2 (Cummins, 1979; Sparks & Ganschow, 1993).

Considering that actively speaking the HL is important begs the question of how the variance in children's use of the HL can be explained. Previous research has looked into certain factors that might play a role in explaining this variance. For example, research has found that older siblings negatively influence the HL proficiency (Bridges & Hoff, 2014; Rojas et al., 2016; Tsinivits & Unsworth, 2020) as does the ability of parents to understand the majority language (Tubergen & Mentjox, 2014). HL input from *both* parents was found to be a positive predictor of HL use by bilingual children (De Houwer, 2007), just as input richness was found to have a positive influence on bilingual language development (Jia & Fuse, 2007; Paradis, 2011; Unsworth, Brouwer, De Bree & Verhagen, 2019). Finally, the length of exposure to the majority language was proposed as a factor that might lead to a stagnation in the development of a HL (Allen, Crago & Pesco, 2006).

The goal of this thesis is to investigate the impact of the combination of these factors – i.e., *Siblings*, *Family constellation*, *Parental proficiency*, *Input richness*, and *Length of exposure* – on HL use. They have all been investigated separately, but research that combines them is currently lacking. This is important because certain factors might overlap, or certain factors might be more influential than others. When just investigating a factor on its own these effects are invisible, and as a bilingual child is influenced by the combination of factors and not just a factor at a time, investigating them together gives an honest observation of what happens with a bilingual child when developing and using two languages.

The thesis aims, by analysing already existing data from two groups of bilingual children (Moroccan-Dutch and English-Dutch), to find an answer to the following question: "What predicts active HL use in bilingual children aged 4 to 7?".

The HL use of the two different bilingual groups was investigated to see whether groups differed or that the findings hold. It might be the case that findings are language non-specific, or that certain aspects of each language play a role in the variation of language use as well. As the data from the Moroccan-Dutch and English-Dutch bilinguals was obtained by using the same questionnaire (BiLEC; Unsworth, 2013), potential differences cannot be explained by differences in instrument use.

One important difference between the two groups is that the status of both language groups differs hugely in the Netherlands. Moroccan-Dutch bilinguals often speak either Berber or Moroccan-Arabic as their HL, which are both considered low-prestige among its speakers, and often leads to Dutch becoming the lingua franca of the Moroccan-Dutch bilinguals in the Netherlands (p. 112, Dorleijn & Nortier, 2008). Whereas English is often

seen as a prestigious language in the Netherlands, possibly because of the existence of English in education and it being widely available in modern media (Edwards, 2014).

In addition, there are a lot less resources available for Moroccan-Dutch children in their HL, than there are for English-Dutch children. In fact, English is a subject that is mandatory at secondary schools in the Netherlands, therefore, these English resources, like books and TV-shows, are also available to the Dutch monolingual speaker. While English is often viewed as useful, and learning and maintaining English skills is frequently encouraged by education, the government, as well as by most of the general population, the outlook on the Moroccan languages (Berber and Moroccan Arabic) is often a lot less positive. Parents speaking non-Western languages are often discouraged from speaking their HL with their children, but this is usually not the case for parents speaking Western languages (van den Bergh, 2005; as cited in Van Leeuwen, 2013; De Blaauw, 2017)

The remainder of this thesis is organised as follows. Chapter 2 contains an extensive overview of the current literature on HL proficiency and use. It starts with an explanation of the field of active HL use, followed by a literature review of different factors that might explain individual differences between children in their HL use. This chapter also describes the gap in the research field and states the research questions and corresponding hypotheses that are used to achieve the goal of this study. From here on, the thesis is divided into two different studies, both using a different participant group. Chapter 3 presents the methodology, results, and discussion of Study 1 (Moroccan-Dutch bilinguals). Chapter 4 includes the methodology, results, and discussion for Study 2 (English-Dutch bilinguals). In Chapter 5 the two studies are discussed together in the general discussion, combined with implications and limitations. The main body of the thesis ends with Chapter 6; the conclusion. After this, the references and appendices are listed.

Chapter 2. Literature Review

2.1. Heritage Language Use

The present study investigates bilingual children's use of their Heritage Language (HL). There is not one well-established definition for HL. While some scholars argued that a HL is the language acquired first but which never *fully* acquired (Polinsky & Kagan, 2007), and others argued that people with a HL are dominant in the language of the society around them (Benmamoun, Montrul & Polinsky, 2013; Cummins, 2005), the present study follows the more general definition proposed by Valdés (2000), who stated that the HL is "a language acquired by individuals raised in homes where a dominant language in the larger society, is not spoken or is not exclusively spoken." (p. 51, as cited in Hummel, 2014).

Furthermore, the present study aims to investigate *active HL use*, which differs from HL proficiency, although they are often used interchangeably in the literature. They are, however, two different concepts. Whereas proficiency is something that develops over time and can be measured rather easily, HL use is more abstract and more difficult to operationalize, which might be the reason that current research often focuses on HL development, instead of HL use. HL use might be more of a conscious decision, which is certainly influenced by external sources such as the language an interlocutor speaks, but it differs from proficiency in the sense that it can be switched on and off, which is impossible for the proficiency. A speaker cannot decide from one moment to the next that they will become more or less proficient in a language. While the definitions of use and proficiency differ, they are also related in some way. To be able to use a language, a certain degree of proficiency is needed, and to become more proficient more use of the language is often required.

Lastly, to avoid confusion, it should be noted that the term *minority language* also appears in the literature section of this thesis, as much of the relevant literature on the subject uses this term rather than the HL. The terms are frequently used interchangeably as they both indicate the language other than the majority or societal language in the environment of the participants. The decision for the term HL was made as the present study focuses on a group of Moroccan-Dutch bilinguals as well as a group of English-Dutch bilinguals. Where the Moroccan languages, Berber and Moroccan Arabic, could definitely be described as a minority language in the Netherlands, this is not the case for English. The English language is widely available in the media as well as education and therefore calling it a minority does not really fit the definition as a language that is in the minority as opposed to a majority language. While English also does not fit the description of a majority language, the majority of the inhabitants of the Netherlands does speak English. While the proficiency levels might vary heavily, it would be possible to live in the Netherlands without speaking a word of Dutch. As English does not fit into the category minority language in the Netherlands, but also cannot be considered a majority language, English is considered a heritage language within this thesis.

The following section will firstly explain the importance of a HL, before entering into the literature overview of different factors that might play a role in active HL use.

2.2. Importance of the Heritage Language

There are a number of reasons why HL development and use are important. These include the importance of the HL for the development of an L2, as well as the role HL use and proficiency play in family well-being.

Following the Developmental Interdependence Hypothesis (Cummins, 1979), a L2 (i.e. the HL) can only be successfully developed when enough knowledge about the L1 (i.e. the majority language) has been obtained. Similarly, the FL Linguistic Coding Deficit Hypothesis (Sparks & Ganschow, 1993) states that deficits in the L1 lead to developmental

issues of the L2, because the transfer of, for example, writing, reading, and phonology is impossible. While these hypotheses mostly focus on proficiency outcomes, and this study investigates the active use (i.e. output) of the HL of bilingual children, the hypotheses are still of great importance. It has been touched upon that while proficiency and use differ, they are also intertwined to a certain degree, as using a language will strengthen the proficiency in that language. It is, therefore, quite important to use a L1 often to build L1 language skills which in turn can support the attainment of a L2.

Another reason that argues for the need for well-developed HL skills is family well-being. Müller et al. (2020) performed a scoping review on the effects of bilingualism on family well-being. One of their findings was that active HL use positively influenced family well-being. Those adolescents who spoke their HL well had better relationships with their parents. These relationships might be the result of better communication or a better understanding of their cultural heritage, which supports the relationship between child and parent (p. 1059). However, it might also be the case that the relationship between child and parent is the cause of this better communication and understanding of cultural heritage, as Tannenbaum and Howie (2002) found that children who had less positive views of their family used the HL less than those children with positive relationships. In light of these findings, it is useful to figure out what other factors aid active HL use, to better foster those familial relationships, which in turn can lead to more HL use, completing the full circle.

Factors that have been shown to be relevant to active HL use, as well as HL proficiency, include input and family factors. The following sections will provide an overview of the literature on these factors. Firstly, the input factors: input quantity and input quality are discussed, after which the family factors: family constellation and siblings are discussed.

2.3. Input factors

2.3.1. Input Quantity

When investigating (bilingual) language development, one of the factors that is taken into account is the amount of input children receive. This is also commonly called the quantity of input or amount of exposure. Many studies have reported on the influence of exposure on the acquisition of an L2. Studies have focused on different participant groups, for example, immigrant families living in the Netherlands (Scheele, Leseman, & Mayo, 2010), and bilingual communities in Wales (Gathercole & Thomas, 2009). However, most agree that exposure is an important factor in predicting language development variance (see review paper, Unsworth, 2016), with more exposure to a language often leading to better performance in that language.

Similarly, studies have also looked at the influence of majority language exposure on the development of a minority language. For example, Allen, Crago & Pesco (2006) studied the influence of exposure to the majority language English and French on the minority language Inuktitut within a group of 8 to 9 and 15 to 16-year-olds, and adult participants from Inuktitut-speaking homes. While stating that more exposure to the majority language might lead to stagnation of the development of the minority language, most of their results appeared inconclusive, as different outcome measures showed mixed results. For example, the negative influence of majority exposure on the Inuktitut proficiency was evident in the number of words per narrative, but non-existent in the case of narrative structure. In addition, exposure was measured dichotomously, participants either resided in large language communities (more exposure to the majority languages) or in small language communities (more exposure to the minority language). This is a limitation of the study as living in a large community does not necessarily mean that participants received more input, simply because more input was

available. A more clear way of measuring input would, for example, be looking at proportional input.

Using a slightly different approach on operationalizing input De Houwer (2007) found evidence supporting the important role of exposure plays in influencing language use. Participants aged 6 to 10 were categorized by the language choice patterns of their parents. Children living in families with two parents who both spoke a non-Dutch language (the study took place in Flanders, therefore the majority language being Dutch), were found to be most likely to use the HL themselves.

Hoff et al. (2012) used proportional input to examine the effect of exposure and showed some more clear-cut results. In this study, the authors investigated the language development of both languages of Spanish-English bilingual children living in the US. Children's vocabulary and grammar development measures in both English and Spanish were collected at ages 1;10, 2;1, and 2;6. Input measures were obtained by interviews and language diaries. Results revealed that the amount of English input was positively related to English development, and not surprisingly, negatively related to Spanish (HL) development.

The previously mentioned studies focused on the current input or exposure. Another way of investigating the impact of input is by using the cumulative exposure which, in addition to the current exposure, takes exposure from the past into account as well. Thordardottir (2011) investigated receptive and expressive vocabulary skills of 5-year-old children acquiring French and English simultaneously. It was found that bilingual children need more exposure to reach similar results in expressive vocabulary as their monolingual peers, however, at a certain point, a threshold effect became apparent, where more input did not lead to better proficiency. Similar results were found in the context of grammar development. Unsworth (2013) investigated a group of simultaneous English-Dutch bilinguals residing in the Netherlands aged 3 to 17, who were acquiring gender-marking. In addition to support for the role of current exposure in language development, cumulative exposure was also found to be a significant predictor of grammar development.

In sum, the factor input quantity has been found to be of importance in language development, in different languages and across language domains. Current exposure in the majority language has been found to negatively impact the language development of the HL. While the amount of research on current exposure is extensive, research on cumulative exposure is quite limited. The few studies that included cumulative exposure as a measure, have shown that it is, in addition to current exposure, also a significant predictor of language development. Although the literature on the influence of input quantity seems to agree, research has so far only focused on the influence on language development, whereas it might also be of importance to language use. The current study will therefore subject the variable input quantity to analyses, to investigate the possible role in predicting HL use.

2.3.2. Input Quality

In contrast to the amount of input, the input can also differ in regards to the quality. Input quality refers to the diversity of the language input. This diverseness could either result from the language input in various activities (i.e. input richness), or the nativeness of the input.

In the case of richness, input quality is often operationalized using the input from different activities such as reading or listening to music, watching TV or playing with friends. Some research focused on the influence of single activities such as playing video games (Sylvén & Sundqvist, 2012) and listening to music (Setia et al., 2012) on language development. Other studies, however, used richness as a measure containing input from all kinds of different activities to be able to explain individual variance in language development. Jia and Fuse (2007) investigated a group of Mandarin speakers aged 5 to 16 who were living in the US. Those speakers who arrived earlier had a richer L2 environment than those children

who arrived later, which might be associated with the finding that the early arrivers were more successful in the acquisition of L2 morphology, possibly because of the positive correlation between richness and morphology acquisition. That this finding, there being a positive correlation between richness and L2 development, holds across languages, was found by Paradis (2011), who investigated bilingual children from seven different language groups. She reported that alongside other factors, such as age, aptitude, or length of exposure, the richness of the L2 environment can significantly predict L2 outcomes. These results are supported by Unsworth et al. (2019), who found that rich input supports language development in a group of pre-schoolers acquiring Dutch in the Netherlands. Lastly, a case study by Gibbon and Ramirez (2004) revealed that richness was also of importance to the Spanish language development of Hispanic teenagers living in Sydney, Australia. The extensive research on the effects of input richness has shown that it is found to be important for language development across languages and across age groups.

The influence of input quality can also be investigated by considering the native versus non-native input, as bilingual children could receive non-native input. For example, parents might decide to use the majority language when addressing their children, despite not being fully proficient in that language. There has been some research on the effects of this non-native input on language development.

On the one hand, studies have focused on parents' majority language proficiency on their children's majority language development. For example, Driessen, Van der Slik & De Bot (2002) showed that the command of Dutch of Morrocan fathers was found to have a negative effect on the Dutch language proficiency of their children. Additionally, Cornips and Hulk (2006) showed that the group of participants with standard-like Dutch input showed less fossilization of grammatical gender than the group that received non-standard like Dutch.

On the other hand, some research also questioned the influence of the majority language proficiency of parents on the minority language proficiency of their children. Tubergen and Mentjox (2014) investigated first and second-generation immigrant adolescents in England, The Netherlands, Sweden and Germany aged 14-16 years. By filling in a survey, the participant's minority language proficiency, in the written (reading and writing skills) and oral (speaking and understanding skills) dimension, was established, as well as a whole host of predictor variables including, for example, cognitive abilities, gender, relationship quality, and the parental proficiency in the majority language. They found that when parents of the participants were proficient in the majority language of the host country, such as Dutch in the Netherlands, the adolescents often scored lower on the minority language skills. However, it should be noted that these results were only present when the combined data from the participants from the Netherlands and Germany were analysed, but not when just the Dutch participants were analysed.

This finding is supported by Lutz (2006), who showed that this also operates in the reversed direction. Data was taken from a longitudinal study, which started in 1988, looking at the language use of English-speaking Hispanic children in the USA. The children rated their own speaking skills in Spanish on a three-point scale (well, not very well, and not at all), which acted as the outcome variable in an ordered logit analysis. Alongside other predictor variables, the influence of parents' speaking proficiency in English (measured on a four-point scale; English only, well, not well, and no English) was investigated. The children with parents who were not able to speak the majority language well had a much bigger chance of exhibiting good Spanish speaking skills.

Both Tubergen and Mentjox (2014) and Lutz (2006) showed the influence of parental proficiency on children's language proficiency, but where they looked at speaking (Lutz, 2006) and a combined proficiency score of speaking, writing, reading and understanding (Tubergen & Mentjox, 2014), proficiency could also be operationalized by solely looking at

understanding proficiency. Lanza (1997; as cited in De Houwer, 2007) noted that bilingual families develop certain "bilingual discourse strategies" (p. 420), because of these strategies multiple languages can exist within one single conversation. For example, parents can understand a language without speaking it, thereby allowing their children to use this language in the conversation, but the parents not using this language.

To summarize, input quality can be measured by either looking at the language input from extra-curricular activities (i.e. input richness) or at the degree of nativeness of the input (i.e. native versus non-native input). Input richness has been found to be quite important for language development, but again, to my knowledge, no studies have investigated the impact of input richness on language use. In the case of native versus non-native input, research has revealed that the majority language proficiency of parents might be very influential for their children's minority language development. Where the two mentioned studies measured proficiency by just asking about speaking abilities (Lutz, 2006) or combining speaking, understanding, reading and writing abilities together in one proficiency score (Tubergen & Mentjox, 2014), the current study proposes to investigate the influence of parental proficiency, by just considering the ability of parents to *understand* the majority language. Parents who understand the majority language, but do not speak it themselves, might facilitate their children in majority language use as opposed to conversing with their children in the minority language.

2.4. Family factors

2.4.1. Family Constellation

Parental input, as well as input from school or daycare, is of great importance to the language development of bilingual children (Gathercole & Thomas, 2003; Hoff & Core, 2013; Paradis, Nicoladis & Crago, 2007). While those studies often operationalized the input as a relative measure across all types of input, others focus solely on the language spoken by family members. This measure of parental input could also be used to create family constellation groups. These groups are often based on existing language policies or strategies, such as the One person-One language strategy (OPOL), which has been a regularly recommended strategy. In this approach, children receive their language input from each parent speaking their native language, for example, Spanish from their father and English from their mother (for some case studies see: Harding-Esch & Riley, 2003). While it is still being recommended, there are more and more scholars showing that the OPOL strategy is not always the best approach for raising a bilingual child who is fluent in, and actively uses, both languages (e.g. De Houwer, 2007; Döpke, 1992).

De Houwer (2007) collected data from 1899 bilingual families living in Flanders, Belgium. Families with children between ages 6 and 10 completed a questionnaire to offer insight into the language use inside their homes. Parents were grouped into family constellation groups according to their language use. By comparing children's HL use to the family constellation groups, De Houwer (2007) aimed to find out why certain bilingual children fail to learn two languages. Analyses revealed children need a significant amount of input in the HL to actually use it, as children with parents who both provided HL input proved to be most successful in HL use.

Similar findings were reported by Place (2009). Parents of English-Spanish bilingual 25-month-olds filled in language diaries, which revealed information about the languages used in the interactions with the child. This information was used to create family constellation groups. The expressive vocabulary of the children was measured in both English and Spanish. By comparing the vocabulary scores of the children from different family

constellation groups it was reported that the children only had more Spanish than English words in their vocabulary when they were raised by two native Spanish speaking parents.

Both De Houwer (2007) and Place (2009) reported that these constraints are non-existent for developing the majority language. As children will have contact with the majority language outside of the home, it is not necessary for both parents to also speak the majority language at home. Supporting this remark, are the findings by Unsworth et al. (2019). They investigated the Dutch language development of a group of 50 pre-schoolers. They collected measures of productive and receptive vocabulary, and morphosyntax skills of the participants and linked these to family constellation. It was found that the children who had at least one parent that mostly spoke Dutch exhibited better Dutch performance than their peers who had parents who (both) mostly spoke the HL.

In sum, research has shown that children have the best chance of successfully developing their HL when both parents provide their children with input in the HL. However, this does not come at the expense of the majority language which, because of the sufficient amount of input sources outside the home, will develop just as well. Therefore, the OPOL strategy might not be the best strategy for raising bilingual children who are proficient in both languages. This thesis aims to provide further evidence for the influence of family constellation on HL use and raise awareness for other language strategies families might utilize when raising bilingual children.

2.4.2. Siblings

Not only parents influence the language acquisition of their children, but siblings can also be of influence. The findings in monolingual households seem to be inconclusive. Some studies found that younger siblings have worse language skills compared to their older siblings (e.g. Bornstein, Leach, & Haynes, 2004). However, other studies found that younger siblings actually exhibit better language skills for certain language outcomes, significant findings were only found for pronoun use and not for general language development (e.g. Oshima-Takane, Goodz & Derevensky, 1996). This finding might be explained by the fact that younger siblings have the opportunity to hear their mother and older sibling talk and these conversations are often more linguistically complex, which supports the younger sibling in their language development (Oshima-Takane, Goodz & Derevensky, p. 631).

In bilingual research, siblings are often seen as the cause of a change in the language environment. Obied (2009) found that older siblings in Portuguese-English families are usually more inclined to speak the minority language compared to their younger siblings. In addition, it was also found that the arrival of a younger sibling often shifts the language balance within a family towards the majority language. Similar results were found by investigating Iranian-Swedish families residing in Sweden. Kheirkhah and Cekaite (2018) found that the use of Swedish increased when siblings were present in the family. This increase of majority language input from siblings might also have implications for the majority language proficiency of bilingual children.

Sorenson Duncan and Paradis (2020) investigated the influence of older sibling input. They found that the input from older siblings was positively related to a number of L2 skills. They explained that this might be because of a better quality of input. As has been previously discussed, parents might not always be able to offer native-like input to their children, whereas older siblings do have this ability due to following education in the societal language.

Similar results were presented in an extensive study by Bridges and Hoff (2014). They investigated a group of Spanish-English bilingual toddlers living in the US with and without older school-aged siblings. These toddlers were tested on their Spanish and English vocabulary and grammar skills at ages 22 and 30 months. Toddlers with older siblings heard more English in the home and exhibited better English skills. Furthermore, Bridges and Hoff

(2014) looked into the effects of the presence of older siblings on the HL development. Children who had an older sibling were less advanced in Spanish (the HL) than their peers without an older sibling. Rojas et al. (2016) found evidence supporting the findings by Bridges and Hoff (2014) in an older group of participants. Families of Spanish-English bilinguals aged 4 to 7 acquiring English as a L2 were subjected to questionnaires and narrative samples measuring children's expressive language skill. The results revealed that the input older siblings provided was predictive of performance in Spanish.

While both Bridges and Hoff (2014) and Rojas et al. (2016) showed that the presence of older siblings is negatively associated with the HL development of bilingual children, conflicting results were revealed in a study on Greek-Dutch bilingual toddlers by Tsinivits and Unsworth (2020). By using the BiLEC and CDIs for Dutch and Greek, the effects of older siblings on the language development of their younger siblings were investigated. While finding that the participants with older siblings used less Greek, and performed better in Dutch than the toddlers without an older sibling, interestingly no differences were found in the Greek (the HL) development.

To summarize, siblings have been found to influence family language patterns, often triggering a shift to the majority language and therefore the cause of more majority language exposure within the home, as well as being the provider of more majority language input to their younger siblings. This increase in exposure has been proposed as an explanation for the positive correlation that has been found between the presence of older siblings and the better majority language proficiency of the children. Most existing literature on the subject of siblings had a participant sample consisting of toddlers. This thesis aims to find out if the findings hold for an older participant group, as well as investigating the influence of siblings on HL use instead of proficiency.

2.5. Research gap

This literature review presented research on different factors that have been found to play a role in HL development. The overarching gap that exists in almost all literature discussed, is that they focused on the influence of the input and family factors on HL development; almost no studies included HL use as a dependent variable. The current study, therefore, investigates the influence of the combination of different factors on HL use.

Research on input quantity has found that it has a positive influence on HL development (Allen, Crago & Pesco, 2006; Hoff et al., 2012). Currently, research that takes into account that bilingual children have to divide their input between two languages is scarce (exceptions: Thordardottir, 2011; Unsworth, 2013). More research regarding cumulative exposure is needed, as it gives a more honest measure of children's input over time.

Regarding the quality of input, input richness has been found to be a significant predictor of HL development (Jia & Fuse, 2007; Paradis, 2011). The main research gap concerning this factor, is that no studies focused on the influence of richness on language use, while language use was found to be important to the family well-being (Müller et al., 2020).

Additionally, a few studies have looked at parental proficiency (Tubergen & Mentjox, 2014; Lutz, 2006) and have shown that parents' command of the majority language negatively influences the children's HL development. It is yet unknown how just the ability to understand the majority language influences children's HL use. As this is the lowest degree of proficiency needed to allow children to use the majority language at home, it is interesting to investigate the influence of this kind of proficiency.

In the case of family constellation, literature is in favour of bringing children up in families where both parents speak the HL instead of families where one parent speaks the HL while the other speaks the majority language (De Houwer, 2007; Place, 2009). However, it

remains unclear if the influence of the factor of family constellation stays critical when combined with other measures of input.

Lastly, research has agreed on the negative influence of older siblings on the HL development (Bridges & Hoff, 2014; Rojas et al, 2016; with the exception of Tsinivits & Unsworth, 2020), but they mostly focused on a participant sample of toddlers. It is currently unknown how the presence of older siblings influences the HL use of children aged 4-7.

Concluding, the current thesis will investigate HL use by considering the variables: *Length of Exposure (LoE), Richness*, *Parental proficiency*, *Family constellation*, and *Siblings*.

2.6. Research Questions & Hypotheses

The aim of this study is to investigate a number of factors that may influence active HL use, by analysing the data from two groups of bilingual children, namely English-Dutch and Moroccan-Dutch bilinguals. The main research question is as follows:

- What predicts active heritage language (HL) use in bilingual children aged 4 to 7?

To answer this research question, the thesis will focus on five factors that might predict active HL use, as specified in the following five sub-research questions:

1) What is the influence of *Siblings* on the active HL use of bilingual children?

The influence of older siblings is expected to negatively influence the active HL use of the participants. Previous literature has found that, for example, toddlers with older siblings who went to school were less advanced in their HL (Bridges & Hoff, 2014). Similar findings have been reported by Rojas et al. (2016). While these two studies report on language skills and not language use, it is still expected that these findings will hold for the present study.

2) What is the influence of *Family constellation* on the active HL use of bilingual children?

With regards to family constellation, the hypothesis is based on findings by De Houwer (2007). It is expected that children who receive HL input from both parents will more actively use the HL than those children who only receive HL input from one parent, therefore family constellation, or more specifically the number of parents who provide HL input, will positively influence active HL use.

3) What is the influence of *Parental proficiency* on the active HL use of bilingual children?

Not much research on the topic of parent's ability to understand Dutch exists. While focused on adolescents, and therefore an older group of participants than this thesis analyses, the expectations are based on findings by Tubergen and Mentjox (2014). Children with parents who have good proficiency in Dutch will have the opportunity to speak Dutch to their parents, and therefore will use the HL less. Dutch understanding proficiency of the parents is thus expected to negatively influence the active use of the HL by the participants.

4) What is the influence of input *Richness* on the active HL use of bilingual children?

Previous research has found that input richness has a significant influence on the language development of bilingual children (Jia & Fuse, 2007; Paradis; 2011; Unsworth et al., 2019). Therefore, it is expected that the bilingual children participating in this thesis will use the HL more when they encounter richer input in their HL. In other words, input richness is expected to have a positive influence on the active use of the HL.

5) What is the influence of the *Length of exposure* on the active HL use of bilingual children?

The expectation for this question is based on two studies that found that exposure to a majority language is harmful to the development of an HL (Thordardottir, 2011; Unsworth, 2013). Concluding, it is expected that the length of exposure to the majority language will negatively influence the use of the HL.

As this study investigates the factors simultaneously, it is important to consider that some of these factors might be correlated with each other. It can be expected that having two parents who speak the HL (the family constellation factor) will probably lead to richer input in the HL, while having parents who both also speak Dutch will probably have children who have a longer cumulative length of exposure to Dutch, and less input richness in the HL. These correlations will be considered and will be described in more detail in the analysis sections of the methodology in Chapters 3 and 4.

Chapter 3. Study 1: Moroccan-Dutch bilinguals

This chapter includes the study on the HL use of the Moroccan-Dutch bilinguals. Firstly, the chapter provides an overview of the methodology. Secondly, the results of the regression analysis are presented. Lastly, the results are discussed in relation to the hypotheses and previous literature.

3.1. Method

3.1.1. Participants

The participants of this study were 33 bilingual children living in the Netherlands, with a mean age of 5.22 years (range 4;2 - 7;0, *SD* = .65) and an age of onset (AO) to Dutch ranging from 0 to 5.9 years (M_{AO}= 0.42, SD_{AO}= 1.43). The group consisted of 12 girls and 21 boys. All participants spoke Dutch as well as Moroccan Arabic or Berber. Some participants (n = 9) were also exposed to a third language, either Standard Arabic or French, but the vast majority did not use these languages themselves. Children were first grouped according to the language input patterns of their parents, to investigate the variable *Family constellation*, but as these groups differed considerably in sample size, it was decided to analyse the group as a whole. Participants were recruited from eleven different primary schools in the Randstad area of the Netherlands. The data was collected by Van Leeuwen (2013) for her research master's thesis, who analysed them for different purposes.

3.1.2. Materials

To gather the data about the participants' language use, language input and additional information needed to answer the research questions, the Bilingual Language Exposure Calculator (BiLEC; Unsworth, 2013) was used. This is a questionnaire (Appendix A) in which answers are entered into an excel file that uses algorithms to calculate multiple language use and input measures.

The questionnaire firstly gathers some general information about the child and his or her family. Subsequently, parents are asked about the languages which are spoken inside the home, as well as the language use outside the house (e.g. school or day-care), both in the past and the current situation. By asking questions about language exposure during extra-curricular activities and playing with friends, the questionnaire aims to provide an overview of the quality of the language input. Finally, the questionnaire asks about attitudes to languages, and collects some general information about the parents.

3.1.3. Procedure

The BiLEC was administered at the homes of the participants or via the telephone. Parents could indicate whether they wanted to complete the questionnaire in either Dutch or Berber. Eight parents indicated that they would like to complete the questionnaire in Berber and were therefore interviewed by a Berber-speaking research assistant. All answers were directly entered into the excel files.

3.1.4. Data preparation

The following variables were extracted from the BiLEC data (for a more detailed explanation of the algorithms behind the measures see the BiLEC manual; Unsworth, 2016):

HL use

The variable *HL use* is automatically calculated in the BiLEC excel file. It uses the total hours per week the child uses the HL at home (which is calculated using the total hours of exposure each child has with each different interlocutor in the home taking into account the amount and

which language the child uses with each interlocutor). This number of total hours per week the child uses the HL is divided by the total hours of language exposure per week, resulting in a variable that gives a proportion. 0% indicating that the participant never used the HL, while 100% indicates that all the output a child produced was in the HL.

Age
The variable *Age* indicates the age at the time of testing. It was simply calculated by subtracting the date of birth from the date of testing (in years).

Dutch input
Dutch input was computed by performing a number of different calculations. The number of hours each interlocutor in the home (e.g. mother or sibling) spent with the participant was multiplied by the amount of Dutch the interlocutor used with the participant, to account for the fact that the participant could receive part of its input in one language, and part of it in the other language. Similar calculations were made for the child at school, out-of-school care, and at other activities. All these different calculations led to a number of total hours of exposure to Dutch per week, which when divided by the number of waking hours led to the final variable *Dutch input*. This is a relative percentage of exposure per week, 100% indicating all exposure a participant received was Dutch.

Siblings
The variable *Siblings* indicates if the participant had older siblings. From the questionnaire, a variable indicating the number of older siblings was created. This variable was then used to create a variable with a binary outcome (yes/no) that could be used in the analysis. Out of the 33 participants, 25 had an older sibling, the remaining 8 did not.

Richness
The variable *Richness* was calculated by dividing the total number of hours children spent on extracurricular activities (sports/clubs, friends, reading, TV, Computer, and other language-related activities) from the total hours they participated in these activities in the HL. This resulted in a relative variable that indicates how much the participants used the HL during the extracurricular activities, ranging from 0 to 100%, where 0 indicates the participant never used the HL and 100% indicating that while performing these activities the participant always used the HL.

Length of exposure
As opposed to the variable *Dutch input*, the variable *Length of exposure (LoE)* indicates the exposure from the past. While this is traditionally measured by subtracting the age of onset from the age at testing, the BiLEC also provides a cumulative measure, which takes into account that the child divides its time between two (or three) languages. It is calculated by asking the amount of Dutch input each interlocutor supplied during each year of the participant's life, as well as asking this for input obtained at school or day-care. The variable is supplied in years, the higher the number the more exposure to Dutch a participant has had, and therefore, the less exposure to the HL.

Parental proficiency
Alongside other proficiency aspects such as accent, parents were also asked to give a score to indicate how well they understood Dutch. They were asked to rate this on a scale ranging from 0 to 5:

0. Virtually no understanding, maximally understanding a few simple words
1. Limited understanding, understanding basic words and expressions and can follow basic conversations
2. Some understanding, following simple conversations such as basic instructions
3. Good understanding, following extended conversations like tv-shows
4. Excellent understanding, understanding almost everything
5. Nativelike understanding, understanding pretty much everything

This resulted in two variables specifying the *Parental proficiency* of both the mother and father of the participants. (Please note: while the variable is labelled *Proficiency* it only indicates the ability to *understand* Dutch).

3.1.5. Analysis

The data was analysed with multiple linear regression using IBM SPSS Statistic 27. To investigate which variables could predict the HL use of the participants, the variables were added to the regression analysis using the hierarchical method. Firstly, the two control variables *Age* and *Dutch input* were added to the model. Subsequently, the predictors of interest were added in blocks. First, the block with the input variables was added i.e., *LoE* and *Richness*. Lastly, the remaining variables consisting of the family variables *Siblings* and *Parents' ability to understand Dutch* were added together as one block.

3.2 Results

Table 1 presents the mean scores of the different outcome and predictor variables. It can be seen that the HL was not used much by the participants (*M* = 13%), nor did they receive much rich HL input (*M* = 4%). All participants received at least more than 50% of their input in Dutch (*M* = 78%). Length of exposure to Dutch also proved to be quite long (*M* = 3.34) considering the age of the participants (*M* = 5.22). As for the parents' ability to understand Dutch, both parents proved to be quite proficient (mothers: *M* = 3.85; fathers: *M* = 3.82), moreover none of the parents indicated that they had no understanding of Dutch.

Table 1. *Means and standard deviations of outcome and predictor variables.*

Variable	*M (SD)*	Range
HL use (%)[a]	13 (17)	0 - 62
Age (in years)	5.22 (.65)	4.2 – 7.0
Dutch input (%)[b]	78 (10)	58 - 100
LoE (in years)[c]	3.34 (.86)	1.7 - 4.62
Richness (%)[d]	4 (6)	0 – 24
Proficiency – mother[e]	3.85 (1.03)	1 – 5
Proficiency – father[e]	3.82 (1.21)	1 – 5

[a] Proportion of HL use in the home
[b] Proportion of Dutch input
[c] Length of exposure to Dutch measured cumulatively
[d] Proportion of HL input in extra-curricular activities
[e] Score indicating how well parents understand Dutch, measured on a Likert scale from 0 – 5

Prior to the regression analysis, correlation between the variables was tested by performing a Pearson's' r correlation. All correlations can be found in Appendix B. A number of predictor pairs did reach significance, but not to the point of multicollinearity (r ≥.80; Field, 2009): *LoE* correlated with *Dutch input* (r = .56, *p* <.001), *Proficiency mother* correlated with *Dutch input* (r = .45, *p* = .01), and with *Siblings* (r = -.36, *p* = .04), *Proficiency father* correlated with *Siblings* (r = -.50, *p* = .003) and *Proficiency mother* (r = .43, *p* = .01).

Table 2 presents the three different regression models and their parameters. All assumptions for regression analysis, such as linearity and homoscedasticity, were checked and found to be satisfactory. The best-fitting model was the first one. This explained 36% of the variance. This model contained significant predictors *Age* and *Dutch input*. With every year the participants got older the *HL use* increased by 13%, and with every 1% increase of *Dutch input* the *HL use* decreased by 0.58%. The addition of the input factors, consisting of *LoE* and *Richness*, did not lead to a significant increase in variance explained and neither did the subsequent addition of family factors consisting of *Siblings*, *Proficiency mother* and *Proficiency father.*

Table 2. *Three regression models predicting HL use and their parameters.*

Model		*b*	SE	β	*p*	R^2	F_{change}	*p*
1	Intercept	-0.08	0.27			.36	8.30	.001
	Age[a]	0.13	0.04	.49	.002			
	Dutch input[b]	-0.58	0.24	-.36	.02			
2	Intercept	-0.18	0.29			.39	.72	.50
	Age	0.14	0.04	.52	.002			
	Dutch input	-0.48	0.29	-.30	.11			
	LoE[c]	-0.01	0.04	-.05	.78			
	Richness[d]	0.45	0.40	.17	.28			
3	Intercept	-0.16	0.31			.43	.66	.58
	Age	0.13	0.04	.48	.007			
	Dutch input	-0.44	0.33	-.27	.19			
	LoE	-0.01	0.04	-.06	.78			
	Richness	0.48	0.42	.18	.27			
	Siblings[e]	0.05	0.07	.14	.46			
	Proficiency mother[f]	0.01	0.03	.05	.80			
	Proficiency father[f]	-0.02	0.03	-.13	.49			

[a] Measured in years
[b] Proportion of Dutch input
[c] Length of exposure to Dutch measured cumulatively
[d] Proportion of HL input in extra-curricular activities
[e] Older siblings: no coded as 0, yes coded as 1
[f] Score indicating how well parents understand Dutch, measured on a Likert scale from 0 – 5

To summarize, the findings of the regression analysis showed that the regression model containing just *Age* and *Dutch input* best predicted the HL use of the Moroccan-Dutch participants. The HL use increased with increasing age, and decreased the more input in Dutch the participants received. The remaining variables that were of interest and were added to the analysis in subsequent blocks (*LoE, Richness, Siblings,* and *Parents' ability to understand Dutch)* did not prove to be significant predictors of active HL use.

3.3. Discussion

This study investigated the predicting ability of the variables *Siblings*, *Parental proficiency*, *Richness*, and *Length of exposure* on the outcome variable *HL use*. It was expected that these variables had some degree of predicting ability, but contrary to the proposed hypotheses, none of these variables were found to significantly predict the *HL use* of the Moroccan-Dutch bilinguals. However, the control variables *Age* and *Dutch input* did significantly predict *HL use*.

After a quick look at the results regarding the variable *Age*, the findings do not seem very surprising, as children become older the more they will speak and therefore the more HL they will use. However, seeing as the outcome variable *HL use* is a relative variable, that is relative to the amount of Dutch used, the current finding does not mean that children speak more in general but they use the HL more at the expense of Dutch. As children were aged 4 to 7 years, and were thus school-aged, it was expected that the older children would switch to more use of Dutch within the home. The current results reveal that the Moroccan-Dutch bilinguals show the opposite. The data was investigated to find out if there were any characteristics of the older children that might have caused this unexpected finding, but none of the other predictors included in the regression analysis correlated significantly with *Age* (see Appendix B). It was also checked if age significantly differed between the two language groups represented in the participant sample (Berber: n = 30 & Moroccan Arabic: n = 3), but an independent samples t-test showed the difference between the groups to be non-significant ($t(31) = .70$; $p = .49$). A possible explanation might be linked to family well-being. As children become older they might become more aware of the importance of the HL, or how much their parents value this part of their culture. This could then lead to the child changing its attitude towards the HL, and deciding to use it more instead of using Dutch. While this is a highly speculative explanation, it might be fruitful to investigate the relations between cultural understanding, language use, and age.

The case of *Dutch input* makes more sense and is in line with previous research. The more input in Dutch the children received, and thus the less HL input, the less HL they used. This finding agrees with the studies by, for example, Scheele et al. (2010) on Turkish-Dutch and Moroccan-Dutch bilinguals, as well as the findings reported in Hoff et al. (2012) on Spanish-English bilinguals. While both these studies focused on the influence of input or current exposure on language development, this thesis shows that this influence might also continue to be significant for language use.

With regards to the variables entered into the regression analysis as possible predicting factors, the results showed that none of these were found to be significant. The hypotheses connected to sub-questions 1, 3, 4, and 5 can therefore not be supported by the results of this study.

Sub question 1 focused on the influence of older siblings on the active HL use of the participants. Contrary to the hypothesis, which was based on research by Bridges and Hoff (2014), the current study found that the variable *Siblings* did not significantly predict HL use. The results, therefore, rather agree with the findings of Tsinivits and Unsworth (2020), who also found non-significant results. Where they explain their results with the possibility that the participants live in a rich HL environment, with both parents speaking the minority language. The same explanation does not hold for the group of Moroccan-Dutch participants, as the majority of the participants lived in a household where both parents used Dutch most of the time. A possible explanation for this specific group of participants might be linked to their age. As the participants in the study by Bridges and Hoff (2014) were toddlers the effect of older siblings might only be visible when the participants themselves are not school-aged. As the participants will go to school and have more majority language exposure, the added exposure from older siblings might not be as influential anymore.

Sub question 3 investigated the influence of *Parental proficiency*. It was expected that parental proficiency would negatively influence HL use, but no significant results were found. As this specific group of participants grew up in mostly Dutch-speaking homes, the potential effect of parental proficiency could just be invisible. As most parents were able to speak Dutch at a good level, they were also able to understand Dutch quite well, and the variation in these proficiency levels might not have been substantial enough to show the influence of *Parental proficiency* on the HL use of their children. The current results can, therefore, not support previous findings by Lutz (2006) on the negative influence of parental proficiency in the majority language on HL proficiency and is also unable to expand them to the context of language use.

Sub question 4 looked into the influence of *Richness*. A richer HL input was expected to positively influence HL use, but no significant results were found. These findings can be explained by the variation of input richness between participants, as most participants did not receive much rich input in the HL, the analysis could not reveal any potential effects of input richness in this specific group of participants. Scheele et al. (2010) found significant effects of richness on the language skills of Moroccon-Dutch bilingual children but made the important observation that these children "have less resources available for L1 maintenance and have virtually no access to formal and literate uses of their language" (p. 121, Scheele et al., 2010). The reason for this relatively low amount of input richness might be the scarce availability of TV programmes, books and computer games in Moroccan Arabic and Berber, or the apprehensiveness of parents to supply these activities and materials to their children, because of the often given advice of raising their children with as much Dutch input as possible.

Sub question 5 questioned the influence of *LoE*. Expected was that length of exposure to Dutch would be a negative predictor of HL use, as previous literature on the topic of exposure found that longer exposure led to better language performance (Thordardottir, 2011; Unsworth, 2013). However, the current study did not find any significant results. This might be explained by the role of the variable *Dutch input* which was added to the analyses as a control variable, but appeared to be a significant predictor of HL use. While *LoE* and *Dutch input* did not correlate to the extent of multicollinearity they were correlated to a certain degree ($r = .56$, $p < .001$). This correlation might be the reason why no influence of *LoE* was found, as all the variance had already been explained by the variable *Dutch input*.

Concluding, the answer to the main research question of this thesis: "What predicts active HL use in bilingual children aged 4 to 7?" is, for this specific sample of Moroccan-Dutch bilinguals, the age of the participants and the Dutch input, neither of which were of initial interest to the study. The variables that were of interest were found to not significantly improve the models when added. In the case of older *Siblings*, it might be that the influence of older siblings is only apparent when the participants themselves are not school-aged yet. In this sample, participants were all aged between 4 and 7, and therefore went to school themselves, and all received sufficient Dutch input, regardless of an older sibling. Explanations for the null-findings of the variables *Parental proficiency* and *Richness* are explained by the lack of variation within the group. All parents understood Dutch moderately to very well, and children received almost none rich HL input. Finally, the *LoE* was found to not significantly predict *HL use*, but this might have been found because of the degree of correlation between *LoE* and *Dutch input*.

Chapter 4. Study 2: English-Dutch bilinguals

This chapter includes the study on the HL use of the English-Dutch bilinguals. Firstly, the chapter provides an overview of the methodology. Secondly, the results of the regression analysis are presented. Lastly, the results are discussed in relation to the hypotheses and previous literature.

4.1. Method

4.1.1. Participants

Participants for this study were taken from a larger sample of participants included in the Early Child Bilingualism Project (ECB; Unsworth, 2009), recruited via word of mouth and by approaching schools. Only those participants (n = 83) between the ages of 4;0 and 7;0 were used in this study, to match the ages of the participants in the Moroccan - Dutch sample. Additionally, one participant was excluded from the analysis, as no output measure was reported for this participant, and another three participants were excluded because too many of the predictor measures were missing.

In contrast to Study 1, there was enough variation in language use patterns to group participants according to their family constellation. Family constellation was operationalised in terms of the language their parents spoke most of the time, where most of the time was ≥ 50%. This resulted in three groups: participants whose parents spoke mostly Dutch to them (n = 6), participants with one parent who mostly spoke Dutch and the other mostly the HL (n = 36; from here on called the one parent-one language (OPOL) group), and participants whose parents both mostly spoke the HL (n = 37; from here on called the HL at Home (HLatH) group). As the group of participants with parents who both spoke mostly Dutch was incomparable to the other two groups due to size, it was decided to exclude these 6 participants from further analysis.

The final sample, therefore, consisted of 73 English-Dutch bilinguals (M_{age} = 5.62, SD_{age} = .92), 29 girls and 44 boys, with an AO to Dutch ranging from 0 to 6.17 years (M_{AO} = 1.48, SD_{AO} = 1.85). Data of the participants split into the family constellation groups can be found in Table 3. Interestingly, it was found that in the OPOL families mothers tended to be the English speakers. The number of OPOL families with an English-speaking mother was 29, whereas those with an English-speaking father was 7.

Table 3. *Means and standard deviations of data participants split into family constellation groups.*

Group		*M* (*SD*)	Range
OPOL	Age (in years)	5.52 (0.99)	4.0 – 6.92
	AO[a]	0.11 (0.47)	0 – 2.42
	AO mother	23.84 (13.13)	0 - 40
	AO father	6.53 (12.01)	0 - 46
HLatH	Age (in years)	5.78 (0.84)	4.0 – 7.0
	AO	2.82 (1.70)	0 – 6.17
	AO mother	29.57 (11.93)	0 - 41
	AO father	31.68 (10.22)	0 - 48

[a] *AO is Age of Onset to Dutch measured in years.*

4.1.2. Materials

To gather the data from this group of participants the same questionnaire as in Study 1 was administered: the BiLEC (Unsworth, 2013). Please refer back to section 3.1.2. for more information.

4.1.3. Procedure

In contrast to the data collection in Study 1, the data from the English-Dutch participants was collected using an online version of the questionnaire. It was administered by using LimeSurvey (LimeSurvey GmbH), with the necessary add-ons created by the technical department at the Meertens Institute.

4.1.4. Data preparation

The same variables as in Study 1 were extracted from the BiLEC data. In addition to the other variables, the variable *Family Constellation* (OPOL = 36, HLatH = 37) was created and added as a predictor in the regression analysis. Explanation of the creation of this specific variable can be found in the participants section (4.1.1.). Due to the addition of this variable, the variable *Dutch input* was omitted from the regression analysis as the variable *Family Constellation* used the variable *Dutch input* for its operationalisation. Out of the 73 participants, 40 had an older sibling, the remaining 33 did not.

4.1.5. Analysis

Again, the data was analysed by performing a multiple linear regression analysis in SPSS. Firstly, to see if any interaction between the variables *Siblings* and *Family constellation* existed a pre-analysis was performed. To control for *Age*, it was added to the analysis in block 1, after which the variables *Siblings*, *Family constellation*, and the interaction between the two was added in block 2. In the main analysis, the factor *Siblings* was added first, within the subsequent block the input factor *Richness* (as a correlation analysis showed problems with multicollinearity for the variable *Length of exposure*). In the third block, the two variables for *Parents' ability to understand Dutch* were added, within the final block the addition of the variable *Family constellation*. Two extra regression analyses were performed due to inconclusive findings in the main analysis.

4.2. Results

Mean scores, standard deviations and range of the outcome and predictor variables are presented in Table 4. It can be seen that the HL was used quite often at home (*M* = 62%), and almost half of the rich input of the participants was in the HL (*M* = 45%). The participants had an average LoE to Dutch of 1.79 years. While some parents indicated that they understood virtually nothing of Dutch, proficiency was generally good (mothers: *M* = 3.04; fathers: *M* = 3.23).

Table 4. *Means and standard deviations of outcome and predictor variables.*

Variable	*M (SD)*	Range
HL use (%)[a]	62 (34)	0 - 100
Age (in years)	5.62 (.92)	4.0 – 7.0
LoE (in years)[b]	1.79 (1.35)	0 – 4.5

Richness (%)[c]	45 (27)	0 – 100
Proficiency – mother[d]	3.04 (1.30)	0 – 5
Proficiency – father[d]	3.23 (1.77)	0 - 5

[a] Proportion of HL use in the home
[b] Length of exposure to Dutch measured cumulatively
[c] Proportion of HL input in extra-curricular activities
[d] Score indicating how well parents understand Dutch, measured on a Likert scale from 0 – 5

The means of the outcome and predictor variables split between the family constellation groups are presented in Table 5. In addition to the variables presented in Table 5, siblings were divided as follows: within the OPOL group, 20 participants had an older sibling, and the remaining 16 did not; and within the HLatH group, 20 participants had an older sibling, and the remaining 17 did not.

Independent samples t-tests were performed to test any differences between the two family constellation groups. The groups did not differ in *Age* (t (71) = -1.46; $p = .15$), and they did also not differ on the variable *Siblings* (t (71) = .13; $p = .90$). The groups did however differ in their *HL use* (t (71) = -8.45; $p < .001$), the participants in the HLatH group (M = 86%) used the HL significantly more than those in the OPOL group (M = 38%). Not surprisingly, the groups also differed in *LoE* (t (63.45) = 12.09; $p < .001$) and *Richness* (t (60.07) = -2.98; $p = .004$). The participants in the HLatH group had a shorter *LoE* to Dutch than the participants in the OPOL group (respectively, M = 0.70 and M = 2.90), and the HLatH group received more rich HL input than the OPOL group (respectively, M = 54% and M = 36%). Lastly the independent samples t-test also revealed that the groups differed in *Parental proficiency* for both mothers (t (71) = 4.34; $p < .001$) and fathers (t (71) = 7.50; $p < .001$). Both parents in the OPOL group understood Dutch better than the parents in the HLatH group (fathers, OPOL: M = 4.42, HLatH: M = 2.08; mothers, OPOL: M = 3.64, HLatH: M = 2.46).

Table 5. *Means and standard deviations of outcome and predictor variables split into family constellation groups.*

	Variable	*M (SD)*	Range
OPOL	HL use (%)[a]	38 (24)	0 – 83
	Age (in years)	5.46 (.99)	4 – 6.92
	LoE (in years)[b]	2.90 (.90)	0.7 – 4.5
	Richness (%)[c]	36 (19)	0 – 81
	Proficiency – mother[d]	3.64 (.96)	1 – 5
	Proficiency – father[d]	4.42 (1.16)	1 – 5

HLatH	HL use (%)	86 (25)	0 – 100
	Age (in years)	5.78 (.84)	4 – 7
	LoE (in years)	0.70 (.64)	0 – 2.9
	Richness	54 (31)	3 – 100
	Proficiency – mother	2.46 (1.33)	0 – 5
	Proficiency – father	2.08 (1.48)	0 – 5

[a] Proportion of HL output in the home
[b] Length of exposure to Dutch measured cumulatively
[c] Proportion of HL input in extra-curricular activities
[d] Score indicating how well parents understand Dutch, measured on a Likert scale from 0 – 5

Before the regression analysis was run all variables were entered into a Pearson's r correlation (for the entire correlation matrix see Appendix C). Multiple correlation coefficients of predictor pairs reached significance: *LoE* correlated with *Richness* (r = -.46, $p < .001$), *Proficiency mothe*r (r = .60, $p < .001$), and *Proficiency father* (r = 0.72, $p < .001$) Children who had a longer *LoE* to Dutch received less rich HL input, and their parents were often better at understanding Dutch. *Richness* correlated with *Proficiency mother* (r = -.46, $p <$ .001), and *Proficiency father* (r = -.40, $p <$.001). Those children who received less rich HL input had parents who were less advanced in understanding Dutch. *Proficiency mother* correlated with *Proficiency father* (r = .45, $p <$.001). The correlation coefficient of the predictors *LoE* and *Family constellation* (r = -.82, $p < .001$) indicated multicollinearity ($r \geq$ .80). Those children who had a longer *LoE* to Dutch were often a part of the OPOL families (raised with one parent speaking Dutch, and the other speaking English). Because of this multicollinearity, it was decided to exclude *LoE* from further analysis as *Family constellation* was of more interest.

Correlations were run again for each family constellation group separately (Appendix D). This analysis showed a very strong and significant correlation between *Age* and *LoE* in the OPOL group (r = .78, $p < .001$), but not in the HLatH group (r = .06, $p = .72$). Furthermore, the correlations between *Proficiency mother* and *Proficiency father* with *Richness* were both only found in the HLatH group and not in the OPOL group (respectively, r = - .49, $p = .002$; r = - .39, $p = .02$). In the HLatH group if parents understood Dutch well, their children did not receive much rich HL input.

The models and parameters of the first regression analysis are presented in Table 6, this analysis was run to investigate the possible interaction effect of the predictors *Siblings* and *Family constellation*. Only model 2 was found to be significant and explains 52% of the variance ($p < .001$), with the significant predictor *Family constellation*. Participants in the HLatH group exhibited 43% more HL use than the participants in the OPOL group. As this analysis showed that *Age* and the interaction between *Siblings* and *Family constellation* were not significant predictors it was decided to exclude them from further analysis. The predictor *Siblings* was also found to not be significant but was kept in the subsequent analysis as it was of interest in the study.

Table 6. *Two regression models predicting HL use and their parameters.*

Model		*b*	SE	β	*p*	R^2	F_{change}	*p*
1	Intercept	0.50	0.25			.004	.26	.61
	Age[a]	0.02	0.04	.06	.61			
2	Intercept	0.47	0.18			.52	24.05	<.001
	Age	-0.02	0.03	-.05	.59			
	Siblings[b]	0.01	0.08	.01	.92			
	Fam. Const.[c]	0.43	0.09	.64	<.001			
	Interaction[d]	0.09	0.12	.12	.42			

[a] Measured in years
[b] Older siblings: no coded as 0, yes coded as 1
[c] OPOL coded as 0, HLatH coded as 1
[d] Interaction between siblings and family constellation

As the interaction between *Siblings* and *Family constellation* was found to be not significant, the regression model and parameters of the final regression analysis are presented in Table 7. Assumptions like linearity and homoscedasticity were checked and it was found that the standardised residuals were negatively skewed due to the presence of two outliers, as observed by the histogram and both the Kolmogorov-Smirnov and the Shapiro-Wilk test. It was decided to exclude these outliers, which fixed the main problem of skewness and it made it possible to continue with the regression analysis (for further explanation, see Appendix E). Model 1, with just *Siblings* as a predictor variable, did not significantly predict the variance. Adding significant predictor variable *Richness* led to a significant model explaining 25% of the variance (p <.001). Further addition of *Proficiency mother* and *Proficiency father* led to an R^2 increase of .23 (p <.001). Both *Richness*, *Proficiency mother* and *Proficiency father* were significant predictors in this model. The final addition of the predictor *Family constellation* led to model 4 which explained 72% of the variance (p <.001). The final model, therefore, consists of predictors *Siblings*, *Proficiency mother*, *Proficiency father* and significant predictors *Richness* and *Family constellation*. With each 1% increase of richness HL use increases by 0.24% and the participants in the group HLatH have 44% more HL use than those participants in OPOL group.

Table 7. *Four regression models predicting HL use and their parameters.*

Model		*b*	SE	β	*p*	R^2	F_{change}	*p*
1	Intercept	0.63	0.06			<.001	.03	.87
	Siblings[a]	0.01	0.08	.02	.87			
2	Intercept	0.35	0.08			.25	22.39	<.001
	Siblings	0.03	0.07	.05	.66			
	Richness[b]	0.61	0.13	.50	<.001			
3	Intercept	0.95	0.13			.48	14.95	<.001
	Siblings	0.04	0.06	.06	.50			
	Richness	0.26	0.13	.21	.05			
	Proficiency mother[c]	-0.07	0.03	-.28	.01			
	Proficiency father[c]	-0.07	.02	-.38	<.001			
4	Intercept	-0.50	0.22			.72	53.31	<.001
	Siblings	0.02	0.04	.03	.63			
	Richness	0.24	0.09	.20	.01			

	Proficiency mother	-0.03	0.02	-.12	.15
	Proficiency father	<0.001	0.02	.001	.99
	Fam. Const.[d]	0.44	0.06	.68	<.001

[a] Older siblings: No coded as 0, yes coded as 1
[b] Proportion of HL input in extra-curricular activities
[c] Score indicating how well parents understand Dutch, measured on a Likert scale from 0 – 5
[d] OPOL coded as 0, HLatH coded as 1

What can be seen in Table 7 is that the variable *Parental proficiency* is significant for both the mother and father in Model 3, whereas this effect disappears when adding the variable *Family constellation*. After inspection of the histograms for both parents' proficiency in each family constellation group, it became apparent that within the OPOL group, where mainly mothers were the English speakers, the ability to understand Dutch was quite high, while the variation was much bigger in the HLatH group (see Appendix F). To better investigate the effect of this variable it was decided to perform two additional regression analyses. For each family constellation group the analysis was performed again, within the OPOL group only the proficiency score of the mothers was used, as the fathers were commonly the Dutch speakers.

Table 8 presents the regression models of the analysis of the OPOL group. As in the main analysis, the variable *Siblings* did not lead to a significant model predicting *HL use*, but the addition of the variable *Richness* produced a model which predicts 28% of the variance (p = .001). The final addition of the variable *Proficiency mother* led to the best model predicting 40% of the variance (p = .02). The ultimate model predicting *HL use* in the HLatH group, therefore, consists of the variable *Siblings* in combination with the significant predictors *Richness* and *Proficiency mother*. With each 1% increase of richness the HL use increases by 0.65%, and with each 1 point increase of the proficiency of the mothers (measured on the 6-point scales) the HL use decreases by 8%.

Table 8. *Three regression models predicting HL use and their parameters (OPOL group).*

Model		*b*	SE	β	*p*	R^2	F_{change}	*p*
1	Intercept	0.37	0.06			.000	.01	.92
	Siblings[a]	0.01	0.08	.02	.92			
2	Intercept	0.09	0.09			.28	13.36	.001
	Siblings	0.06	0.07	.13	.89			
	Richness[b]	0.69	0.19	.55	.001			
3	Intercept	0.41	0.16			.40	5.96	.02
	Siblings	0.06	0.07	.13	.36			
	Richness	0.65	0.18	.52	.001			
	Proficiency mother[c]	-0.08	0.03	- .34	.02			

[a] Older siblings: No coded as 0, yes coded as 1
[b] Proportion of HL input in extra-curricular activities
[c] Score indicating how well parents understand Dutch, measured on a Likert scale from 0 – 5

Table 9 presents the regression models of the analysis of the HLatH group. Again, similar to the previously presented regression analyses, *Siblings* did not lead to a significant model predicting *HL use*. The subsequent addition of the variable *Richness* led to a significant model explaining 11% of the variance (p = .05). The final addition of the two proficiency variables did not increase the predictive ability of the model. Therefore, the best fitting model to predict

HL use was Model 2, with the variable *Siblings* and significant predictor *Richness*. With each 1% increase of richness the HL use increases by 0.15%.

Table 9. *Three regression models predicting HL use and their parameters (HLatH group).*

Model		*b*	SE	β	*p*	R^2	F_{change}	*p*
1	Intercept	0.91	0.04			.000	.000	.99
	Siblings[a]	0.001	0.05	.003	.99			
2	Intercept	0.82	0.05			.11	4.14	.05
	Siblings	- 0.002	0.05	- .01	.97			
	Richness[b]	0.15	0.08	.34	.05			
3	Intercept	0.89	0.09			.19	1.49	.24
	Siblings	0.01	0.05	.03	.85			
	Richness	0.11	0.09	.24	.23			
	Proficiency mother[c]	0.01	0.02	.06	.77			
	Proficiency father[c]	- 0.03	0.02	- .33	.10			

[a] Older siblings: No coded as 0, yes coded as 1
[b] Proportion of HL input in extra-curricular activities
[c] Score indicating how well parents understand Dutch, measured on a Likert scale from 0 – 5

To summarize, the main analysis showed the last model including all variables was the best-fitting model. This included the variables *Siblings*, *Parental proficiency*, *Richness* and *Family Constellation*. Only the latter two were found to significantly predict HL use. Regarding *Richness*, those children who received rich HL input were more likely to use the HL, and regarding *Family constellation*, those children in the HLatH group were more likely to use the HL. The two extra analyses on each family constellation group separately revealed that the variable *Parental proficiency* of mothers became a significant predictor in the OPOL group. An increase in mothers' ability to understand Dutch, led to a decrease in HL use by their children.

4.3. Discussion

This study investigated the predictive ability of the variables *Siblings*, *Family constellation*, *Parental proficiency*, and *Richness* on the *HL use* of the English-Dutch bilinguals using a multiple linear regression analysis. Results revealed the significant predicting ability of the variables *Richness* and *Family Constellation*, combined with the other variables in a model explaining a considerable amount of the variation in the HL output of the participants.

In the case of the variable *Richness*, the results agree with the hypothesis, which stated that the richer the HL input the more HL the participants would use. The results revealed that the more activities like reading, watching TV, and playing with friends, the children participated in in the HL, the more the children used the HL. Therefore, these findings support the body of literature which has shown that *Richness* is a predictor of HL development (Jia & Fuse, 2007; Paradis; 2011; Unsworth et al., 2019), and adds to the current literature that *Richness* is also a predictor of HL use.

Concerning the variable *Family constellation*, it was expected that the children in the HLatH families would use the HL more than their peers in the OPOL families. The results of the regression analysis revealed *Family constellation* to be a significant predictor of HL use and provide support for the hypothesis as the children in the HLatH group used the HL considerably more than the children in the OPOL group. The current study, therefore, also

agrees with the findings of De Houwer (2007) and her statement that "the one person-one language situation appears to be neither a necessary nor a sufficient condition [for children to speak two languages]" (p. 420).

The other variables *Siblings* and *Parents' ability to understand Dutch* were both found to be non-significant predictors of *HL use*. Explanations of these unexpected findings have previously been proposed in the discussion section of the Moroccan-Dutch group (3.4.).

As for the non-significant influence of older siblings on the HL use, the same explanation as for the Moroccan-Dutch group could hold. It was expected that older siblings would be a negative predictor of HL use, but no significant results were found. Possibly because the participants in this sample were, themselves, school-aged and received enough Dutch input at school, which made the effect of older siblings' additional Dutch input undetectable.

As for the variable *Parental proficiency*, it was hypothesised that the children whose parents are better at understanding Dutch (i.e. those having a higher proficiency score) will use the HL less. The results regarding *Parental proficiency* appeared to be non-significant in the main analysis. Within the group of the Moroccan-Dutch bilinguals, this null-finding was explained by the degree of variation. Most parents of the Moroccan-Dutch participants rated their proficiency quite high, and therefore, it might have been possible that the regression analysis did not show any significant effects. However, the group of English-Dutch bilinguals had much more variation within the *Parental proficiency* measure, especially when considering the results divided into family constellation groups. There was much more variability in the proficiency scores of the parents in the HLatH group, so it was expected that the extra regression analyses per *Family constellation* group would support the hypothesis at least when considering the data from the HLatH children. In contrast to the hypothesis, *Parental proficiency* remained non-significant in the HLatH group. Surprisingly, the proficiency of mothers showed to be a significant predictor of HL use in the OPOL group (proficiency of fathers was left out of the analysis, as they were mostly the Dutch speakers in the home). These mothers were often the English speakers but had a good to excellent understanding of Dutch, which was revealed to be predictive of less HL use by their children. The effects of *Parental proficiency* might, therefore, only be visible when parents understand a language very well, but do not use it themselves when speaking to their children.

To summarise, based on the findings of the study with the English-Dutch participants, the answer to the main research question: "What predicts active HL use in bilingual children aged 4 to 7?" is the *Richness* of the input and the *Family constellation*. The other variables included: *Siblings* and, to some degree, *Parental proficiency*, were, contrary to the proposed hypotheses, found to be not predictive of HL use. Further explanation of these findings as well as the comparison to the results of the Moroccan-Dutch group will be provided in the following chapter.

Chapter 5. General Discussion

5.1. Introduction

The aim of this thesis was to investigate which factors predict active HL use. Previous research has proposed the factors *Siblings*, *Family constellation*, *Parental proficiency*, *Richness*, and *LoE*, as playing a role in HL proficiency and use. The current study performed multiple linear regression analyses to investigate the influence of these factors in a group of Moroccan-Dutch and English-Dutch bilinguals aged 4 to 7. In the group of Moroccan-Dutch bilinguals, *Age* and *Dutch input* explained the variance in HL use. While in the group of English-Dutch bilinguals *Richness* and *Family constellation* were significant predictors of HL use. The proceeding sections compare the findings in the different bilingual groups, provide the implications of the findings, both theoretically and practically, and discuss the limitations of the current study.

5.2. Comparison of findings Moroccan-Dutch and English-Dutch bilinguals

Table 10 presents an overview of which variables were found to significantly predict HL use in each of the two studies. The overview shows that there are two variables with different outcomes in the two bilingual groups, these are the variables *Age* and *Richness*.

As the age of the participants was entered into the analyses as a control variable, there is no hypothesis regarding this variable. However, *Age* was found to be a positive predictor of HL use in the analysis of the Moroccan-Dutch bilinguals, but not in the English-Dutch group. The findings in the Moroccan-Dutch group were surprising, as with increasing age the HL was used more at the expense of Dutch. None of the other predictors correlated (near) significantly with the variable *Age*. A speculative explanation might be that these Moroccan-Dutch children started to understand the cultural importance of the HL with increasing age, and therefore started to use the HL more. It is, however, unclear why the age of the participants was found to significantly predict HL use in the Moroccan-Dutch group but not in the English-Dutch group.

Regarding *Richness*, it was expected that the richer the HL input was the more HL the children would use. Previous research has revealed the influence of input richness on language development in a number of languages (Jia & Fuse, 2007; Paradis et al., 2011; Unsworth et al., 2019), the current research adds that *Richness* is also predictive of HL *use* of English-Dutch bilinguals. Similar results were not found in the group of Moroccan-Dutch bilinguals. The difference between the findings for the variable *Richness* could be explained with the degree of variation in the two groups. In the group of the Moroccan-Dutch bilinguals, the variation of input richness was quite small, almost all participants received little to no HL input during these language-related activities (M = 4, SD = 6, range: 0 - 24%). Whereas the English-Dutch bilinguals received considerably more rich HL input (M = 45, SD = 27, range: 0 - 100%). This could explain why there were significant results for the English-Dutch group but not for the Moroccan-Dutch group.

The other variables: *Dutch input*, *LoE*, *Siblings*, *Parental proficiency*, and *Family constellation* were also investigated. However, for these variables, similar results were found, or they were not investigated in both groups. The following paragraphs will discuss the results of each of these variables.

Dutch input was added as a control variable in the regression analysis of the Moroccan-Dutch group and was found to be a negative predictor of HL use. The more input was provided in Dutch the less the HL was used. As input was added as a control variable no hypothesis exists. Nonetheless, the findings do support the literature on the influence of input on HL development. For example, Hoff et al. (2012) showed that the amount of English input Spanish-English children received was negatively related to Spanish development. The

current results, therefore, support these findings and expand them to the domain of language use.

As for the variable *LoE,* it was expected that the length of exposure to Dutch would negatively influence the HL use. In contrast to this hypothesis, the results showed the variable to be non-significant in predicting HL use of the Moroccan-Dutch bilinguals (the variable was omitted in the English-Dutch analysis due to multicollinearity problems). However, it might not be the case that this finding necessarily contradicts previous literature (Thordardottir, 2011; Unsworth, 2013), but rather that the finding is the result of the influence of another variable in the regression analysis. *LoE* was added after *Dutch input* had already been added, and as these variables correlated to some degree ($r = .56$, $p < .001$) the variance in *HL use* might have been explained by the significant negative predictor *Dutch input*.

With respect to the variable *Siblings,* it was expected that the children with older siblings used the HL less, as their older siblings served as an additional source of Dutch input. Previous research, which acted as the basis of the hypothesis, focused mainly on the effect of older siblings on the language development of toddlers (Bridges & Hoff, 2014; Tsinivits & Unsworth, 2020). Therefore, the unexpected finding of *Siblings* not being a significant predictor might be explainable by the older age category of the participants included in the current study, namely 4 to 7 years. Additionally, the hypothesis was based on the assumption that older siblings are a source of Dutch input, but the analyses did not include the language participants spoke with their older siblings. While not likely, it might be the case that in the specific samples included in the study, siblings were not necessarily a source of additional Dutch input, while also not being a source of more HL input, as the regression analysis would then probably have shown a positive effect of older siblings on HL use.

Regarding *Parental proficiency,* the results are less clear. It was hypothesized that the children with parents who understood Dutch well would use the HL less, because they could use Dutch when conversing with their parents. Results supporting these findings were only found in the analysis of the mothers in the OPOL groups within the English-Dutch families. All the other analyses revealed non-significant results. Part of the results can be explained due to the low degree of variation, but as the *Parental Proficiency* in the HLatH group of the English-Dutch bilinguals was quite varied and these also failed to show significant results, it seems like that there might be a different reason for these inconclusive findings. The mothers whose proficiency was a significant predictor of HL use, were often the English speakers, but understood Dutch quite well. It might, therefore, be the case that the effects of *Parental proficiency* are only visible when they are included for the parents who do not speak the majority language, but do understand the HL quite well. As previous literature on the effect of *Parental proficiency* focused on speaking proficiency (Lutz, 2006) and a measure of multiple proficiency scores (Tubergen & Mentjox, 2014), it is difficult to compare them to current findings, especially the unexpected finding of only the proficiency of the mothers in the OPOL families being predictive of HL use. Further research regarding this variable is, therefore, encouraged.

Family constellation was only investigated in the group of English-Dutch bilinguals. It was expected that the children in the HLatH group would use the HL more than the children in the OPOL group, presumably because they received more HL input. The results confirmed the hypothesis, and therefore provide support to the research by De Houwer (2007) and Place (2009). In addition, the family constellation groups were operationalized using the parental input proportions, the children in the HLatH group received at least half of their input in the HL, and received more HL than Dutch input than the children in the OPOL group. The findings, therefore, also supports the body of literature on the effects of input on language development and expands these findings to language use (Hoff et al., 2012; Unsworth, 2013).

Table 10. *Indicating the significance of the variables used to predict HL use in the Moroccan-Dutch and English-Dutch group.*

	Moroccan-Dutch	English-Dutch
Age	Significant	Not significant
Dutch Input	Significant	-[a]
LoE	Not significant	-
Richness	Not significant	Significant
Siblings	Not significant	Not significant
Proficiency mother	Not significant	Not conclusive[b]
Proficiency father	Not significant	Not significant
Family constellation	-	Significant

[a] Indicates that this variable was not included in the analysis.
[b] It was found to be significant in the OPOL group, but not in the HLatH group

5.3 Practical Implications

In addition to the theoretical implications, the study also provides some practical implications. For example, the finding that the richer the HL input the more HL the children will use. This supports the numerous sources that have reported similar results for language development (Jia & Fuse, 2007; Paradis, 2011), but could also be translated into practical advice for parents. As the analysis of the Moroccan-Dutch group failed to show an effect of richness due to small variation, it might be the case that these children received less rich HL input than the English-Dutch children, due to the availability of sources or perhaps because of the difference in status. English children's books, TV programmes and computer games are available in abundance, even for children without English speaking parents, while this is not the case for the Moroccan languages. The second explanation is related to status, and that might be that the parents of the Moroccan-Dutch children were hesitant to supply too much input in the HL, or because not much rich input was available (Scheele et al., 2010). However, studies have shown that input in the HL is not detrimental to the development of the majority language (De Houwer, 2007; Place, 2009), but rather of great importance to HL development. Therefore, parents of bilingual children should be encouraged to read books to their children in their own language or provide their children with TV programmes in the HL wherever possible. Nonetheless, certain languages, such as Berber, are non-scripted which makes the availability of books to read scarce. The use of non-specific language books might be a solution for these families, as parents can introduce the story in their own language without the added distraction of words in another language.

Some more practical advice for parents proceeds from the findings regarding family constellation. The analysis showed that the children who grew up in the HLatH families used the HL considerably more than those children in the OPOL group. Combining this with previous research (De Houwer, 2007; Place, 2009), parents might be most successful in raising children who will actively use the HL by following the HLatH strategy instead of the OPOL strategy. Of course, it might not always be possible to apply this strategy or there are other grounded reasons to choose a different strategy. As these family constellation groups were operationalized using input measures, these findings ultimately support the notion of: more HL input, more HL use. If parents are unable to both speak the HL it could be

considered to provide children with more HL input from for example grandparents or other members of the language community.

Lastly, as a consolidation for parents who want their children to use the HL more, but feel like they have exhausted all sources of input, at least part of the results showed that children will start to use the HL more with increasing age. While these results were an odd finding and should therefore be treated with some caution, letting children grow up might lead to increased HL use.

5.4 Limitations & Future Research

As with any research, this thesis was subject to some limitations.

Firstly, as this study took its data from two different sources (Van Leeuwen, 2013; Unsworth, 2009) the data has not been collected by the author of this thesis herself. While there are no signs of the data collection stage being compromised by the aforementioned authors, a more clear view of this stage would maybe provide answers to some of the unexpected findings or differences between the two groups of participants.

Secondly, the variable *Parental proficiency* proved to be a difficult variable to operationalize within the analysis. As this variable aims to look at a parent's ability to understand Dutch, and therefore allowing their children to use Dutch, it is most interesting to investigate those parents who are not proficient in or use Dutch when speaking to their children. However, it was decided to create family constellation groups after which it became impossible to include just the proficiency score of the parent who was not the Dutch speaker. This was partly fixed by the two additional analyses in the English-Dutch group, and some results showed that parental proficiency is a significant predictor of HL use. The results suggest that parents who understand a majority language but might not speak it themselves, enable children to speak to them in the majority language leading to a decrease in HL use. Even though the results are not conclusive and some operationalization problems occurred, further research should include this measure when investigating HL development or use.

In regards to future research, in addition to some previously mentioned proposals, family constellation should be investigated more extensively. The analysis showed that children in the HLatH group used the HL substantially more than the children in the OPOL group. While these results look promising, the current study was unable to operationalize the variable in the Moroccan-Dutch group of participants, due to the big differences in sample size. Future research might gather more participants in the hopes of creating a more evenly distributed group of participants. Thereby being able to investigate if the findings hold as they were found in the English-Dutch group, that of being a significant predictor and indicating that when both parents speak the HL the child will have a bigger chance of using the HL more, and therefore supporting findings by de Houwer (2007) and Place (2009).

Additionally, it could also be of interest to combine a quantitative study, like this thesis, with a qualitative follow-up, where parents are able to give insights in certain language decisions they made which could possibly support or explain certain findings in the quantitative analyses.

Chapter 6. Conclusion

This thesis aimed to investigate the influence of the combination of input and family factors on active HL use of bilingual children aged 4 to 7. The results revealed that the influence of these factors is different for Moroccan-Dutch than English-Dutch bilingual children. In the case of Moroccan-Dutch children, their age and the amount of Dutch input were predictive of their HL use. The older children became the more Berber or Moroccan Arabic they used and the more input they received in Dutch the less Berber or Moroccan Arabic they used. In contrast to results of the Moroccan-Dutch bilinguals, the results of the English-Dutch bilinguals revealed that the input richness and family constellation were predictive of HL use. The children who received more English input during activities like reading and watching TV-shows were more likely to use English actively, as were the children who lived in homes where both parents used English more than Dutch. Part of the results also revealed that parents' ability to understand Dutch is predictive of active HL use, and this called for the need of further research regarding this domain. Based on these conclusions, it is recommended to supply children with as much HL input as possible, as this will increase children's use of the HL. The increase of HL use is beneficial as it can improve family well-being and serve as a building block for developing the majority language.

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Appendices

Appendix A – BiLEC Questionnaire

No.	Name	Content	Question [Ask parents/guardians questions in *italics*]	Location in Excel file	Notes for completing Excel file
General background information (cf. §3.1)					
	Investigator	Name of investigator completing questionnaire	(To be completed by researcher)	B2-C2	Format chosen by researcher.
1	Name	Full name	*What is your child's name?*	B3-C3	Enter child's name.
	ID	Anonymous identifier code	(To be completed by researcher)	B4-C4	Format chosen by researcher.
2	Gender	Child's gender	*What is your child's gender?* (Or to be completed by researcher)	B5-C5	Select M or F.
3	Place of birth	Country where child was born	*In which country was your child born?*	F2	Select code corresponding to country from drop-down menu.
4	Date of birth	Child's date of birth	*What is your child's date of birth?*	F3	Enter date in following format: 14-Mar-80.
	Date at testing	Date when child was tested	(To be completed by researcher)	F4	Enter date in following format: 14-Mar-80.
5	Date of arrival	(Approximate) date when child arrived in country of residence	*When did your child arrive in (country)?*	F7	Enter date in following format: 14-Mar-80 . Enter D.O.B. for simultaneous bilingual children.
Does your child have any sisters or brothers? If yes → question 6. If no, question 7.					
6	Siblings	Sibling 1's name and current age (in years)	*What are their names and how old are they?*	B14-C14	Enter first name; this will be copied automatically to serve as a reminder in later questions. Enter age in years.
		Same for sibling 2		B15-C15	As for sibling 1.
		Same for sibling 3		B16-C16	As for sibling 1.
		Same for sibling 4		B17-C17	As for sibling 1.
7	Parents	Mother/guardian 1's occupation and level of education	*What is your current occupation?* *What is the highest level of education you have completed?*	F14-G14	Occupation: if adopting ISCO-08, enter relevant code; otherwise, format chosen by researcher. Education: select number from drop-down menu as it relates to options given in 'Lists' worksheet .
		Same for father/guardian 2	*What is your partner's current occupation?* *What is the highest level of education s/he has completed?*	F15-G15	As for mother/guardian 1.
Child's exposure to and use of target language and other language(s) (cf. §3.2)					
8	TL	Name of target language	(To be completed by researcher)	B20	Enter 3-letter code from drop-down menu.
	Type fE	Type of first exposure to TL	*How did your child first come into contact with TL?*	B21-D23	Select up to 3 options from drop-down menu.
	Date fE	Date of first exposure to TL	*When did you child start receiving consistent and significant exposure to TL?*	B24	Enter date in following format: 14-Mar-01. This may or may not be same as date of arrival
	Speaking TL	Estimate of child's ability to speak TL	*How well does your child speak TL?*	B27	Select value from drop-down menu.
	Understanding TL	Estimate of child's ability to understand TL	*How well does your child understand TL?*	B28	Select value from drop-down menu.
9	OL1	Name of (first) other language	*Which other language or languages does your child have contact with?* (Or completed by researcher)	G20	As for TL.
	Type fE	Type of first exposure to OL1	As for TL	G21-I23	
	Date fE	Date of first exposure to OL1		G24	
	OL1 speaking	Estimate of child's ability to speak OL1		G27	
	OL1 understanding	Estimate of child's ability to understand OL1		G28	
10	OL2	Name of second other language	*Is there any other language your child has contact with?*	L20	
	Type fE	Type of first exposure to OL2	As for TL	L21-N23	
	Date fE	Date of first exposure to OL2		L24	
	OL1 speaking	Estimate of child's ability to speak OL2		L27	
	OL1 understanding	Estimate of child's ability to understand OL2		L28	

Languages spoken by people in (regular) contact with child at home (cf. 3.3)					
11	%TL	Estimate of how much each person speaks TL to child	*Think about the people who have regular contact with your child at home. (Using this scale,) how often do each of these people speak TL to your child?*	B36-J36; H34-I34	Specify relationship of any other adults who regularly spend time with the child at home in H34 and I34 from drop-down menu. Enter value between 0 and 1.
	Speaking TL	Estimate of each person's ability to speak TL	*(Using this scale,) how well do each of these people speak TL?*	B37-J37	Select value from drop-down menu.
	Understanding TL	Estimate of each person's ability to understand TL	*(Using this scale), how well do each of these people understand TL?*	B38-J38	Select value from drop-down menu.
	AfE TL	(Approximate) age of first exposure to TL for each person	*Roughly how old was each person when they first came into contact with TL?*	B39-J39	Enter numerical value, using 0 for birth.
12	%OL1	Estimate of how much each person speaks OL1 to child	*How often do each of these people speak OL1 to your child?*	B41-J41	Completed automatically unless OL2 exists; if OL2 exists, enter value for OL1 between 0 and 1.
	Speaking OL1	Estimate of each person's ability to speak OL1	As for TL	B42-J42	As for TL
	Understanding OL1	Estimate of each person's ability to understand OL1		B43-J43	
	AfE OL1	(Approximate) age of first exposure to OL1 for each person		B44–J44	
13	Speaking OL2	Estimate of each person's ability to speak OL2		B47–J47	
	Understanding OL2	Estimate of each person's ability to understand OL2		B48–J48	
	AfE OL2	(Approximate) age of first exposure to OL2 for each person		B49–J49	
Languages spoken by child to other people at home (cf. §3.4)					
14	TL	%TL spoken by child to other people at home	*How often does your child speak TL to you, his/her father, sister, etc. etc.?* Or *Does your child speak TL to you at the same rate as you speak TL to him/her, etc.?*	B55-J55	Enter value between 0 and 1 for each person included in response to questions 11 through 13.
15	OL1	%OL1 spoken by child to other people at home	*How often does your child speak OL1 to each of the people?*	B56–J56	As for question 12.

Languages spoken outside home (cf. §3.5)					
Does your child attend daycare/school? (depending on child's age)? If daycare → go to question 16. If school → go to question 17. If none → go to question 19.					
16	%TL daycare: instruction	%TL spoken by current teacher(s) at daycare	*What is the language of instruction used by the current teacher?*	B63	Enter value between 0 and 1.
	%TL daycare: children	%TL spoken by child to other children at daycare	*In general, which language(s) do the children use with each other there?*	C63	Enter value between 0 and 1.
	TL speaking daycare: instruction	Estimate of ability of present teacher(s) at daycare to speak TL	*How well does your child's teacher(s) speak TL?*	B64	Select value from drop-down menu.
	TL understanding daycare: instruction	Estimate of ability of present teacher(s) at daycare to understand TL	*How well does your child's teacher(s) understand TL?*	B65	Select value from drop-down menu.
	TL speaking daycare: children	Estimate of ability of other children at daycare to speak TL	*How well (on average) do the other children at the daycare speak TL?*	C64	Select value from drop-down menu.
	TL understanding daycare: children	Estimate of ability of other children at daycare to understand TL	*How well (on average) do the other children at daycare understand TL?*	C65	Select value from drop-down menu.
	OL1 daycare	As for TL	As for TL	B69-C70	As for TL, %OL1 completed automatically unless OL2 exists – see question 12.
	OL2 daycare			B74-C75	As for TL.
17	TL/OL1/OL2 school	As for daycare	As for daycare	D63-E65; D69-E70; D74-E75	As for daycare.
Does you child attend out-of-school care? If yes → question 18. If no → question 19.					
18	TL/OL1/OL2 out-of school care	As for daycare	As for daycare	F63-G65; F69-G70; F74-G75	As for daycare.

Holidays (cf. §3.6)					
19	No. of weeks/year	Average no. of weeks of holiday per year	*(How many weeks per year is your child on holiday from daycare?)*	L61	Completed beforehand where possible.
	Average %TL	%TL heard by child during holidays	*Think about when your child is on holiday from daycare/school. How much contact does your child have with the TL during the holidays?* [See guidelines for more information on how best to elicit the required information.]	K65	Enter value from 0 to 1.
	Average quality TL	Estimate of overall quality of TL exposure during holidays	*How much of your child's contact with TL during the holidays is from native speakers?*	L65	Select value from drop-down menu.
	Average % OL1 and OL2	%OL1 and OL2 heard by child during holidays	As for TL	K66-K67	Completed automatically unless OL2 – see question 12.
	Average quality OL1 and OL2	Estimate of overall quality of OL1 and OL2 exposure during holidays	As for TL	L66-L67	Select value from drop-down menu.

Who spends time with child on average day during week and at weekend (cf. §3.7)					
20	Average day during week	Timetable indicating for an average day during the week when child is at home and daycare/school/ out-of-school care and when at home, who spends time with child	*Think about an average day in the week. I'm going to ask you about who spends time with your child at home and when they do this, and about when your child goes to daycare/school.* [See guidelines for more information on how best to elicit the required information.]	B82-M117	Change 0 to 1 in every cell where the person in question spends time with the child, or where the child is at daycare, school or out-of-school care.
21	Average day at weekend	Timetable indicating for an average day during the weekend when child is at home and daycare/school/ out-of-school care and when at home, who spends time with child	*Now think about an average day at the weekend. Who spends time with the child at home then?*	B122-M139	As for average day in during the week.

Other sources of language exposure (cf. §3.8)					
So far, I have mostly been asking you about your child's language exposure from family members and daycare or school. Now, I'm going to ask you about other possible sources of language input, such as TV or friends.					
22	Sports/clubs	Hours/wk spent on given activity	*How many hours per week on average does your child spend on extra-curricular activities such as sports and clubs?*	B146	Enter number (max. 1 decimal place).
		% TL	*In general, which language(s) does your child use during such activities?*	B147	Enter value between 0 and 1.
		Average quality TL	*How well do the other people taking part in this activity speak TL?*	B148	Select value from drop-down menu.
23	Friends	As for sports/clubs	*How many hours per week on average does your child spend with friends outside school (excluding extra curricular activities such as sports and clubs)?* And as for sports/clubs	C146-C148	As for sports/clubs.
24	Watching TV		*How many hours per week on average does your child spend watching TV (including watching DVDs and films)?* And as for sports/clubs	D146-D148	
25	Reading / being read to		*How many hours per week on average does your child spend reading books for leisure (if your child is old enough to read) and/or being read to?* And as for sports/clubs	E146-E148	
26	Using computer		*How many hours per week on average does your child spend playing computer games (which use language), chatting, surfing the internet?* And as for sports/clubs	F146–F148	
27	Other		*Does your child participate in any other language-related activities (e.g., listening to audio books, etc.) which you think might be relevant?* And as for sports/clubs	G146-G148	

Amount of language exposure in the past (cf. §3.9)					
I'm now going to ask you some questions about (your child's language exposure in) the past. *Did your child have any kind of preschool care before the age of 4?* If yes → question 28. If no → question 29.					
28	Days/wk at daycare	Approx. no. of days per week child spent at daycare in given time period	*For about how many days per week?*	B171-B176	Enter number (max. 1 decimal place) for each 1-year period where child attended daycare, up to and including present moment if applicable.
	Daycare	% TL spoken at daycare in given time period	*In general, which language or languages were used there?*	C171-C176	Enter value between 0 and 1 for each 1-year period in child's life when child attended daycare, up to and including present moment if applicable.
29	School	% TL spoken at school in given time period	*Think about your child's schooling. Has your child always attended the same school? In general, how much TL was spoken there?*	D174-D188	Enter value between 0 and 1 for each 1-year period in child's life up to and including the present moment if applicable.
Whilst at school, did you child ever regularly attend any out-of-school care? If yes → question 30. If no → question 31.					
30	Hrs/wk at out-of-school	Approx. no. of hours per week child spent at out-of-school care in given time period	*For about how many hours per week?*	E174-E188	Enter number (max. 1 decimal place) for each 1-year period where child attended out-of-school care, up to and including present moment if applicable.
	Out-of-school care	% TL spoken at out-of-school care in given time period	*In general, which language or languages were used there?*	F174-F188	Enter value between 0 and 1 for each 1-year period in child's life when child attended out-of-school care, up to and including present moment if applicable.
31	Mother / guardian 1	% TL spoken by mother / guardian 1 in given time period	*Now think about your own language use with your child in the past. About how often did you speak TL to your children from birth to age 2, age 2 to age 4, etc.?*	G171-G188	Enter value between 0 and 1 for each 1-year period in child's life up to and including the present moment.
	Father / guardian 2	% TL spoken by father / guardian 2 in given time period	As for mother/guardian 1	H171-H188	As for mother/guardian 1.
	Other adult 1 and 2	% TL spoken by other adults in given time period	*Have any other adults lived at home? If so, what is there relationship to your child?* As for mother/guardian 1	I170-J170; I171-I188; J171-J188	Select option from drop-down menu. As for mother/guardian 1.
	Siblings 1 to 4	% TL spoken by siblings in given time period	As for mother/guardian 1	K171-N188	As for mother/guardian 1; remember time periods refer to child's age and not to sibling's age.
32	Holidays	% TL exposure during holidays in given time period	*During this period, how much contact did your child have with the TL during the holidays?*	P171-P188	As for mother/guardian 1

That was my last question. Is there any other important information about [child's name]'s language use, either now or in the past, that you think we've not covered?

[Enter into *Notes* worksheet, or in appropriate place in Excel file if the information provided means a change in answer to one of the above questions.]

Thank you for your time and patience. [Inform parent about next steps in project.]

Appendix B – Pearson's r correlations outcome and predictor variables (Moroccan-Dutch bilinguals)

Table 11. *Pearson's r correlations between outcome and predictor variables.*

		HL use	Age	Dutch Input	LoE	Richness	Siblings	UP mother	UP father
HL use[a]	r	-							
	p	-							
Age[b]	r	.48*	-						
	p	.005	-						
Dutch Input[c]	r	-.35*	.02	-					
	p	.05	.92	-					
LoE[d]	r	-.14	.25	.56*	-				
	p	.45	.17	<.001	-				
Richness[e]	r	.17	.13	-.18	-.26	-			
	p	.34	.49	.32	.14	-			
Siblings[f]	r	.28	.21	-.04	-.05	-.14	-		
	p	.12	.25	.81	.80	.45	-		
Proficiency mother[g]	r	-.25	-.11	.45*	.30	.03	-.36*	-	
	p	.17	.54	.01	.09	.89	.04	-	
Proficiency father[g]	r	-.33	-.14	.26	.04	-.03	-.50*	.43*	-
	p	.07	.45	.15	.85	.89	.003	.01	-

* Correlations found to be significant

[a] Proportion of HL output in the home

[b] measured in years

[c] Proportion of Dutch input

[d] Length of exposure to Dutch measured cumulatively

[e] Proportion of HL input in extra-curricular activities

[f] Older siblings: no coded as 0, yes coded as 1

[g] Score indicating how well parents understand Dutch, measured on a Likert scale from 0 – 5

Appendix C – Pearson's r correlations outcome and predictor variables (English-Dutch bilinguals)

Table 12. *Pearson's r correlations between outcome and predictor variables.*

		HL Use	Age	LoE	Richness	Siblings	Prof. mother	Prof. father	Fam. Const.
HL Use[a]	r	-							
	p	-							
Age[b]	r	.06	-						
	p	.61	-						
LoE[c]	r	-.79*	.15	-					
	p	<.001	.21	-					
Richness[d]	r	.50*	-.09	-.46*	-				
	p	<.001	.44	<.001	-				
Siblings[e]	r	.08	-.10	-.03	-.03	-			
	p	.53	.38	.81	.77	-			
Proficiency mother[f]	r	-.52*	-.001	.60*	-.46*	.09	-		
	p	<.001	.99	<.001	<.001	.43	-		
Proficiency father[f]	r	-.54*	-.05	.72*	-.40*	.01	.45*	-	
	p	<.001	.66	<.001	<.001	.93	<.001	-	
Fam. Const.[g]	r	.71*	.17	-.82*	.33*	-.02	-.46*	-.67*	-
	p	<.001	.15	<.001	.004	.90	<.001	<.001	-

* Correlations found to be significant

[a] Proportion of HL output in the home

[b] measured in years

[c] Length of exposure to Dutch measured cumulatively

[d] Proportion of HL input in extra-curricular activities

[e] Older siblings: no coded as 0, yes coded as 1

[f] Score indicating how well parents understand Dutch, measured on a Likert scale from 0 – 5

[g] Family constellation: OPOL coded as 0, HLatH coded as 1

Appendix D - Pearson's r correlations outcome and predictor variables split into family constellation groups (English-Dutch bilinguals)

Table 13. *Correlations between outcome and predictor variables in the OPOL group (n = 36).*

		HL Use	Age	LoE	Richness	Siblings	Proficiency mother	Proficiency father
HL Use[a]	r	-						
	p	-						
Age[b]	r	- .283	-					
	p	.10	-					
LoE[c]	r	- .55*	.78*	-				
	p	.001	<.001	-				
Richness[d]	r	.52*	- .42*	-.36*	-			
	p	.001	.01	.03	-			
Siblings[e]	r	.02	-.01	- .03	- .21	-		
	p	.92	.98	.84	.22	-		
Proficiency mother[f]	r	- .39*	.23	.30	- .10	.01	-	
	p	.02	.17	.08	.57	.94	-	
Proficiency father[f]	r	.07	.17	.37*	.02	- .16	- .38*	-
	p	.67	.32	.03	.90	.34	.02	-

* Correlations found to be significant
[a] Proportion of HL output in the home
[b] measured in years
[c] Length of exposure to Dutch measured cumulatively
[d] Proportion of HL input in extra-curricular activities
[e] Older siblings: no coded as 0, yes coded as 1
[f] Score indicating how well parents understand Dutch, measured on a Likert scale from 0 – 5

Table 14. *Correlations between outcome and predictor variables in the HLatH group (n = 37).*

		HL Output	Age	LoE	Richness	Siblings	Proficiency mother	Proficiency father
HL Use[a]	r	-						
	p	-						
Age[b]	r	.12	-					
	p	.47	-					
LoE[c]	r	- .50*	.06	-				
	p	.002	.72	-				
Richness[d]	r	.34*	.01	- .40*	-			
	p	.04	.95	.02	-			
Siblings[e]	r	.22	- .22	- .13	.08	-		
	p	.19	.20	.46	.66	-		
Proficiency mother[f]	r	- .27	- .03	.63*	- .49*	.16	-	
	p	.11	.87	< .001	.002	.35	-	

Proficiency father[f]	r	- .26	.01	.50*	- .39*	.13	.55*	-
	p	.12	.96	.002	.02	.46	< .001	-

[*] Correlations found to be significant
[a] Proportion of HL output in the home
[b] measured in years
[c] Length of exposure to Dutch measured cumulatively
[d] Proportion of HL input in extra-curricular activities
[e] Older siblings: no coded as 0, yes coded as 1
[f] Score indicating how well parents understand Dutch, measured on a Likert scale from 0 – 5

Appendix E – Explanation of deletion of the outliers

The following histogram, skewness statistics and normality tests show the negatively skewed distribution of the standardised residuals.

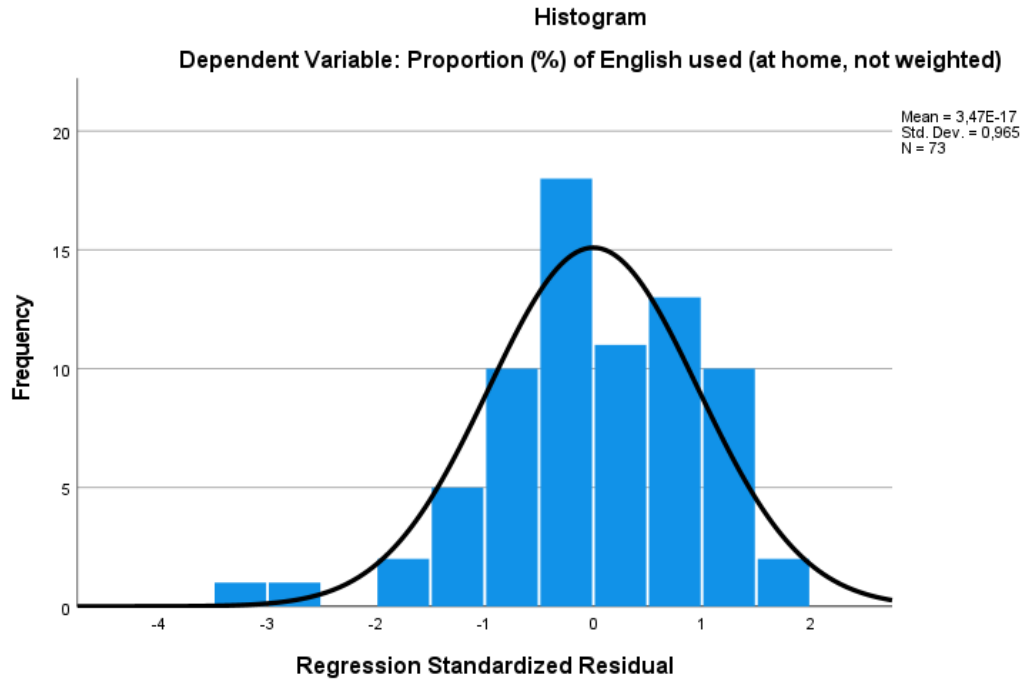

Figure 1. *Normal distribution of the standardised residuals.*

Table 15. *Skewness statistic of the standardised residuals.*

	Statistic	Standard error
Skewness	-0.89	0.28

Table 16. *Normality tests of the standardised residuals.*

	Kolmogorov-Smirnov			Shapiro-Wilk		
	Statistic	df	*p*	Statistic	df	*p*
Std. Residual	0.07	73	.20	0.96	73	.01

The following figure and tables show the distribution, skewness and normality tests after the deletion of the two outliers.

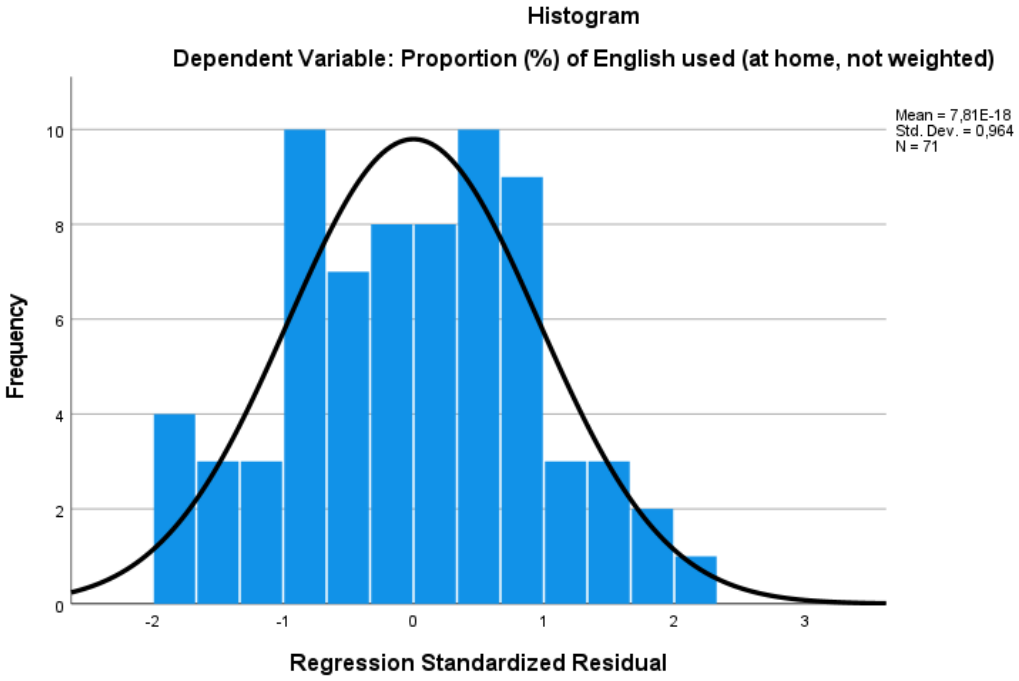

Figure 2. *Normal distribution of the standardised residuals.*

Table 17. *Skewness statistic of the standardised residuals*.

	Statistic	Standard error
Skewness	- 0.04	0.29

Table 18. *Normality tests of the standardised residuals.*

	Kolmogorov-Smirnov			Shapiro-Wilk		
	Statistic	df	*p*	Statistic	df	*p*
Std. Residual	0.08	71	.20	0.99	71	.66

Appendix F – Histograms of variable Parental proficiency split into family constellation groups.

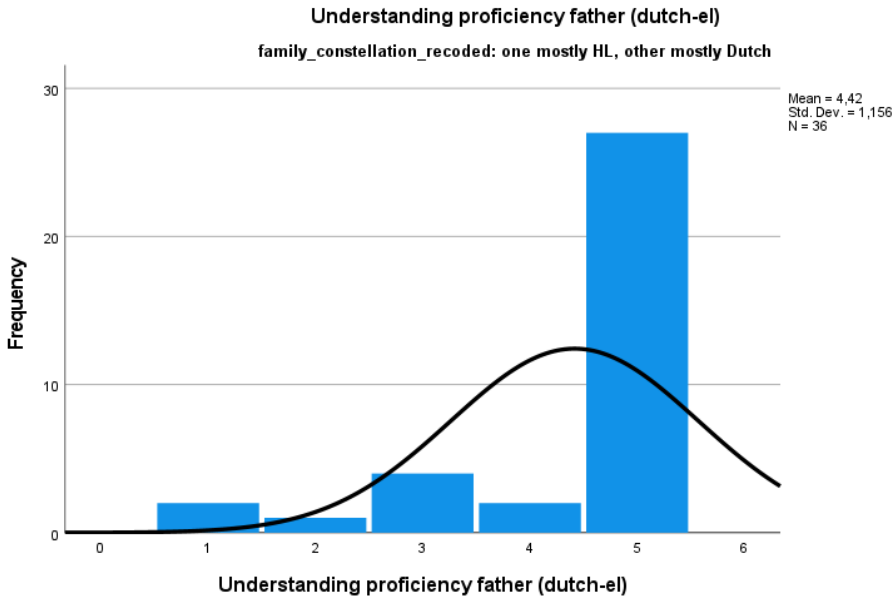

Figure 3. *Histogram of the variable Parental proficiency of fathers in the OPOL group.*

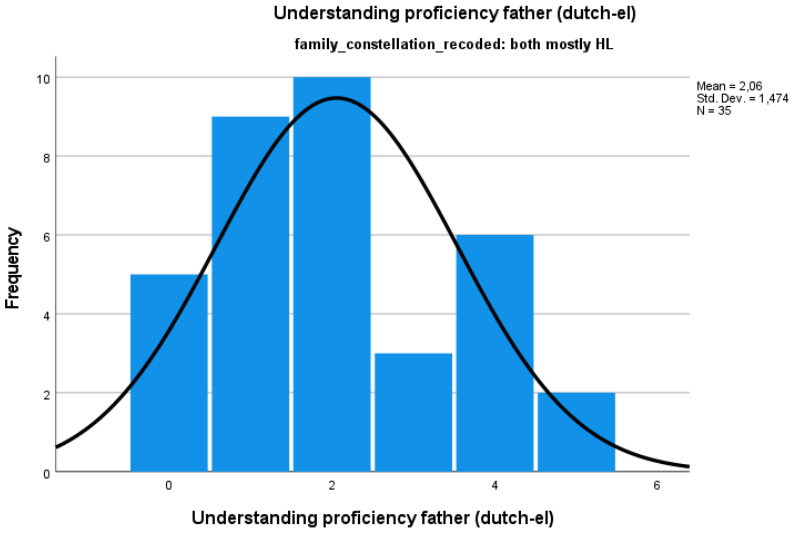

Figure 4. *Histogram of the variable Parental proficiency of fathers in the OPOL group.*

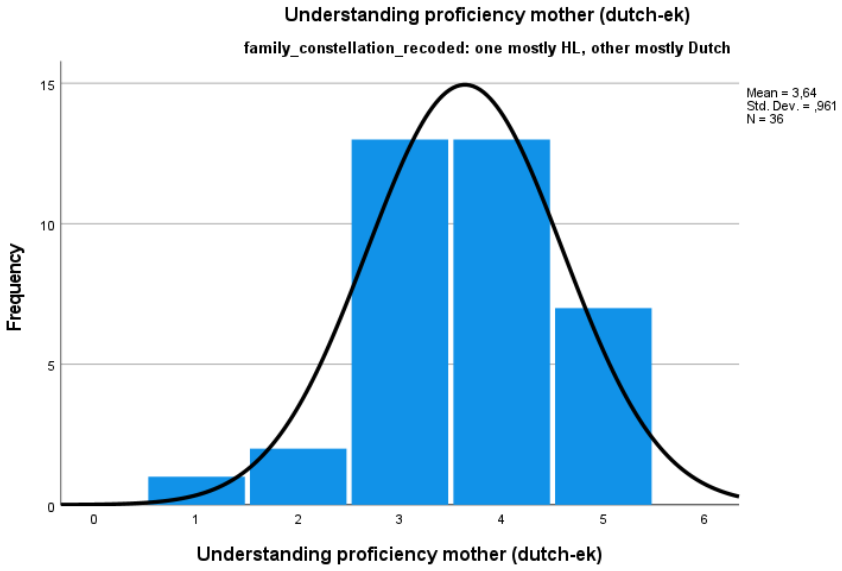

Figure 5. *Histogram of the variable Parental proficiency of mothers in the OPOL group.*

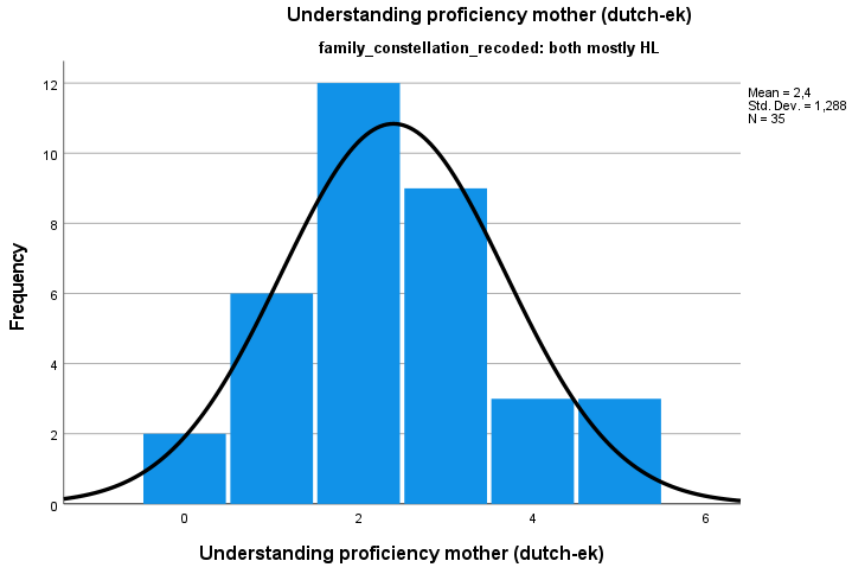

Figure 6. *Histogram of the variable Parental proficiency of mothers in the HLatH group.*