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Second language acquisition in a language immersion context. A structural model about the role of intelligence and language attitudes



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ABSTRACT

This study aims to know how fluid intelligence and linguistic attitude participate in the language learning of young people who are in a linguistic immersion situation in Catalonia. Considering the linguistic particularities of the Catalan territory, a path model has been designed in which the effect of the fluid intelligence and linguistic attitude on the acquisition of the two official languages of the territory (Spanish and Catalan) in young immigrants of Romanian origin is studied. The results show how fluid intelligence exerted a significant facilitating effect of medium-low magnitude on learning of similar intensity for both languages. However, the attitude shows to exert a significant facilitating effect of low magnitude for the acquisition of the vehicular language (Catalan), but not significant for the language of non-academic use (Spanish). These results suggest that fluid intelligence and linguistic attitude are facilitating agents of language acquisition in situations of linguistic immersion, although in the case of attitude, the intensity of this effect may depend on the way in which learners are in contact with the language.

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Adquisición de segundas lenguas en contextos de inmersión lingüística. Un modelo estructural acerca del rol de la inteligencia y las actitudes lingüísticas

RESUMEN

Este estudio pretende conocer el modo en que la inteligencia fluida y la actitud lingüística participan en el aprendizaje lingüístico de los jóvenes que se encuentran en situación de inmersión lingüística en Cataluña. Considerando las particularidades lingüísticas del territorio catalán, se ha diseñado un modelo path en el que se estudia el efecto de la inteligencia fluida y actitud lingüística sobre la adquisición de las dos lenguas oficiales del territorio (castellano y catalán) en jóvenes inmigrantes de origen rumano. Los resultados muestran que la inteligencia fluida ejerce un efecto facilitador significativo de magnitud media-baja sobre el aprendizaje de intensidad similar para ambas lenguas. Sin embargo, la actitud muestra ejercer un efecto facilitador significativo de baja magnitud para la adquisición de la lengua vehicular (catalán), pero no significativo para la lengua de uso no académico (castellano). Estos resultados sugieren que la inteligencia fluida y la actitud lingüística resultan agentes facilitadores de la adquisición del lenguaje en situación de inmersión lingüística, aunque en el caso de la actitud la intensidad de este efecto puede depender del modo en que los aprendices están en contacto con la lengua.

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Palabras clave:

Adquisición de segundas lenguas

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Análisis path

Introduction

Second language acquisition is an essential task for children whose families emigrate to a country with a different language. In addition to providing access to the necessary social support to integrate into the new environment (Cavichio et al., 2020), is necessary for them to quickly learn the language of the host community to achieve the established academic objec-

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tives. Several countries that receive immigration, concerned of the importance of this process, launch language immersion programs. These programs have proven to be effective in their mission, since they accelerate the process of acquiring the language of the host country (Tedick & Wesely, 2015). However, the relative homogeneity of the procedures applied contrasts with the variability observed in the learning pace of participants (Huguet et al., 2011).

Ellis (2015) considers that the psychological factors that cause variability in the acquisition of second languages can be grouped into three main axes: cognitive, conative, and affective. The cognitive axis refers to those factors that influence the processing, storage and retrieval of information. The conative axis includes the factors that influence students' ability to set a goal and maintain the effort to achieve it. Finally, the affective axis groups the factors that determine whether people respond positively or negatively to specific situations. Understanding to what extent each of these factors has an effect on the language development of immigrant students is essential in the design of effective second language acquisition programs. Consequently, this study aims to find out how the factors intelligence and attitude, related to the cognitive and conative axes respectively, explain the variability observed in the level of language skills achieved by young people who are in a situation of language immersion.

Fluid intelligence and second language acquisition

Fluid intelligence is a concept derived from the model proposed by Cattell-Horn-Carroll (CHC Theory; McGrew, 2009). This concept refers to the ability to perform mental operations that lead to problem solving without the need for prior knowledge (McGrew, 2009). Within the framework of general education, numerous studies show the relationship between fluid intelligence and the acquisition of academic knowledge (e.g. Primi et al., 2010). However, with regard to second language learning, this relationship is less evident. The classic works by Genesee (1976) and Sasaki (1993) suggest that fluid intelligence is related to the acquisition of second languages. However, studies such as that of Ganschow and Sparks (2001) warn of the presence of students with a low IQ score and great ability for acquiring second languages and vice versa. Recent studies show how fluid intelligence, acquired in an academic context, exerts a relatively modest effect. While the study by Pishghadam and Khajavy (2013) shows that intelligence explains 12.2% of the variance in a group of Iranian adult English learners, the study by Debatin et al. (2019) concludes that in their sample constituted by preadolescent German students the effect of intelligence is not significant for learning English.

This study aims to reveal the effect of fluid intelligence in a learning context based on language immersion; a context in which the target languages are learned both through their academic use as a vehicular language, and through social interactions in non-academic contexts. To do this, a model that analyses the direct effect of intelligence on competence in the target languages as well as the possible indirect effects that intelligence can exert through the heritage language (HL) is proposed. This effect would be transferred to second languages through the phenomena of linguistic interdependence and transfer (Cummins, 1979; Odlin, 1989).

Language attitude and second language acquisition

The study of language attitudes describes languages as elements towards which an attitude is developed; that is, people have a natural tendency to evaluate the languages with which they are in

contact as either favourable or unfavourable (Baker, 1992, p. 11), as well as to carry out positive or negative actions towards them according to the result of these evaluations (Sarnoff, 1970, p. 279). Therefore, language attitudes establish, along with motivation, to what extent individuals are actively involved in learning a language (Gardner, 1985, p. 56). Numerous studies demonstrate the relevance of language attitudes in language acquisition processes (Baker, 1992; Garrett, 2010) and their use (Moriarty, 2010) and, as a consequence, in processes of social and educational integration (Alarcón & Parella, 2013). Therefore, it is important to know the variables that cause the generation, maintenance and change of these attitudes (McKenzie, 2010). In the case of young immigrants, language attitudes are usually acquired and developed during the process of adaptation and socialization to the new environment, so the design of language learning programs associated with school reception plans (Trenchs-Parera & Patiño-Santos, 2013) and the age of arrival in the receiving country (Huguet et al., 2013) are fundamental elements in explaining the development of these attitudes. In this regard, Huguet and González Riaño (2004, p. 20) describe three main elements capable of shaping the language attitudes of speakers: (a) personal needs, related to the perceived benefits or advantages of acquiring a language for an instrumental use; (b) social group, related to the influences exerted by the reference social group and the speaker's need for social approval; (c) access to each of the languages, as in the degree to which the target language is present and accessible in the host territory, both through direct experiences (social events) and through social media (press, TV, cinema, etc.). These elements are essential in explaining the attitudinal differences between the different languages spoken in the same territory.

The studies carried out in Catalonia show that immigrant secondary school students, unlike their native counterparts, tend to develop better attitudes towards Spanish than towards Catalan (Lapresta et al., 2018; Madariaga et al., 2013). The study by Lapresta et al. (2010) shows that while the attitudinal development of autochthonous students is strongly associated with their feeling of belonging to the Catalan society, immigrant students develop their attitudes towards both Catalan and Spanish through elements such as personal satisfaction, perception of value and school and social integration. In turn, this study shows that immigrant students tend to consider Catalan as a necessary, palatable language that facilitates integration into Catalan society, while Spanish is considered a useful language, of national prestige, widely used and a vehicle to communicate with many people. On the other hand, the study by Trenchs-Parera and Newman (2009) shows that young immigrants residing in Catalonia perceive Catalan as a tool for social progress, so their attitude towards this language, unlike their native counterparts, tends to be supported by instrumental rather than identity elements. Naturally, there are other variables that act upon the attitude of young immigrants towards these languages. An important factor, according to Madariaga et al. (2013), is the length of stay. This factor favours an increase in positive attitudes towards Catalan, since according to the findings by these authors, young people who have resided for more than six years in Catalonia show better scores in this regard. Along the same lines, the work of Ianos et al. (2017) shows, through a longitudinal study, how these young people significantly improve their attitude towards Catalan after two years of stay in Catalonia, while their attitudes towards Spanish remain stable.

As a whole, the current literature portrays language attitudes as complex and dynamic processes in which the agents of variation affect each of the languages relatively independently. Consequently, this study intends to analyse how these two language attitudes participate in the acquisition of linguistic competences of each of the languages to which they refer.

The present study

This study is located in Catalonia, a Spanish autonomous community that has experienced a significant increase in its immigrant population, becoming one of the European territories that has received the most immigrants since the beginning of the millennium (Eurostat, 2021). To manage this growing language diversity, Catalonia is developing an educational policy of language immersion intending to guarantee that, by the completion of their compulsory secondary education, all students will have full mastery the two official languages, regardless of their mother tongue. However, the way in which these two languages participate in the students' learning process is different: while the Catalan language is the vehicular language for most of the taught content, Spanish is reserved for the teaching of a small number of subjects, among which is learning the language itself.

It is important to note that these young people are in a language immersion environment, since learning these languages will also be related to their use beyond the school context. In Catalonia, outside the academic sphere, the preferred language for the immigrant population tends to be Spanish. This tendency, called pattern of subordination to Spanish (Boix & Vila-Moreno, 1998), results from a predisposition to use the Spanish language with people with whom there is no previous contact and becomes the language of habitual use for most after-school relationships. This pattern explains why, although the preferred language in the academic field is Catalan, Spanish generally ends up imposing itself as the *lingua franca* of communication (Vila et al., 2009). Although the reasons for this inclination towards Spanish are still unclear, the tendency on the part of the family environment to establish Spanish as the preferred host language could be one of the main causal agents (Nussbaum, 2005). However, the pattern of subordination to Spanish is not a uniform phenomenon. Linguistic competences have shown to be reciprocally related to language uses; this means that a greater knowledge of a language implies a greater tendency to use it, which in turn will enhance said language knowledge (Oller & Vila, 2011). A similar relationship occurs with language attitudes, which seem to participate as mediation elements in the relationship between language uses and competences (Lapresta et al., 2010).

In summary, we find that Catalan is the predominant language used in the academic environment and Spanish tends to be the predominant language in the extra-academic social environment. This distinction is conceptualized by Cummins (1979 and 2008), who highlighted the difference between using language in formal situations, where CALP (Cognitive Academic Language Proficiency) skills would be put into practice, and informal situations, where BICS skills (Basic Interpersonal Communicative Skills) would be put into practice. Thus, what has been stated in the previous paragraphs suggests that immigrant students are likely to put into practice the Catalan language through CALP skills and the Spanish language through BICS skills, so the way in which these are acquired and the pace at which these develop is different. In this sense, the study by Navarro and Hugué (2010) shows that in language skills tests aimed at analysing CALP skills, immigrant students obtain higher scores in Catalan than in Spanish.

In short, even though the situation of language immersion in which immigrant students find themselves in Catalonia allows them to learn both languages in formal and informal situations, the way in which they are exposed to each language is substantially different. Thus, considering Catalonia's linguistic particularities, this study explores the possibility that the variables intelligence and language attitude explain differently the level of competences reached in each of the languages. Consequently, the following research questions were addressed:

RQ1: Does fluid intelligence have the ability to exert a facilitating effect on the acquisition of second languages through language

immersion programs? Considering that Catalan and Spanish are typologically similar languages, but the way they are learned is different, does it have a similar effect for both languages? Does fluid intelligence have the ability to exert an indirect effect on second language acquisition through its direct effect on HL?

RQ2: Does language attitude have the capacity to exert a facilitating effect on the acquisition of second languages through linguistic immersion programs? Considering that attitudes towards Catalan and Spanish are based on different aspects, do they have a similar effect in both languages? Can the age of arrival have an indirect effect on second language acquisition through its direct effect on language attitudes?

According to the literature presented in the previous sections, it is hypothesized that fluid intelligence would have a positive direct effect of similar magnitude in both languages. In turn, a possible indirect effect of intelligence through HL is theorized. Regarding attitude, a positive effect is hypothesized for both languages; however, considering that the attitude associated with each language is developed through different factors, it is estimated that the magnitude of its effect could also be different. Likewise, the age of arrival was estimated as a variable capable of exerting an effect on language competences, both directly and indirectly through its action on attitudes.

Method

Participants

The sample used for this study was made up of 131 students between the second and fourth year of Compulsory Secondary Education (74 girls and 57 boys, according to their self-reported sex; $M_{age} = 15.06, SD = 1.58$). The students belonged to seven public educational schools located in two provinces of Catalonia (Lleida and Tarragona). The selection of the schools was made for convenience, choosing schools that had an acceptable number of students who met the requirements of the study. All the participants were born in Romania and lived in Catalonia for several years, with a mean time of residence of 9.35 years ($SD = 3.03$). Within this sample, 55% used both their HL and the official languages of the host territory (Catalan and Spanish) in their family nucleus, while 45% used only HL. Regarding the socioeconomic level, 85.5% of the participants reported as low, 10.7% as medium and 3.8% as high.

Regarding the sociodemographic characteristics of the provinces chosen for this study, the province of Lleida has 439,727 inhabitants, of whom 4.76% have Romanian nationality; the province of Tarragona has 822,309 inhabitants, of whom 2.38% have Romanian nationality. These percentages are substantially higher than those of the provinces of Barcelona and Girona, which are 0.57% and 1.84% respectively (Catalan Institute of Statistics, 2021).

Regarding sociolinguistic characteristics, the data show a rather heterogeneous reality. In the province of Lleida, 57% of its inhabitants use Catalan as their habitual language, 22.5% use Spanish and 7.2% use both languages, figures that differ from those of Tarragona (Catalan, 40.4%; Spanish, 41.4%; and both languages, 7.5%) (Generalitat de Catalunya, 2019).

Instruments

The measurement of the *linguistic competences* of the participants has been carried out through a test designed by the Catalan Teaching Service (SEDEC) (Bel et al., 1991, 1993). This test is frequently used in studies seeking to measure linguistic skills in the Catalan context (e.g., Hugué et al., 2011, 2012) and has acceptable levels of reliability and validity.

While the original instrument consists of two parallel tests, one for each official language in Catalonia, for this study a third test has been designed which aims to measure the level of *competence in the Romanian language*, in which the Romanian Ministry of Education has intervened and has had the supervision of teachers of Romanian language. The tests analyse the following aspects of language: oral comprehension, morphosyntax, spelling, written comprehension, written expression, lexicon-morphosyntax oral expression, oral expression organization of information, phonetics, reading correction and reading intonation. Each of these aspects receives scores in a range from 1 to 100 according to the number of correct and incorrect answers.

Attitudes towards Catalan and Spanish have been measured using two scales, one for each language. The scales are made up of 10 dichotomous response items that address aspects of aesthetics of language, instrumental value of language, language learning and pragmatic aspects of language. Students must say whether or not they agree with the different statements made on each scale. Affirmative responses add +1 to the final score, while negative responses subtract -1. The scale includes values from +10 (very positive attitude) to -10 (very negative attitude). These scales have been used in studies on linguistic skills in Catalonia (e.g., [Ianos et al., 2017, 2019](#); [Madariaga et al., 2016](#)).

For the scale of attitude towards Catalan, values of $\alpha = .78$, $\omega = .78$, AVE = .55 and CR = .76 have been obtained. Likewise, for the scale of attitude towards Spanish, values of $\alpha = .75$, $\omega = .74$, AVE = .53 and CR = .73 have been obtained.

Fluid intelligence has been measured using the G2A version of the Factor “g” Test by [Cattell and Cattell \(1990\)](#). This test provides IQ values minimising the influence of linguistic, cultural and educational aspects, which are not desirable for the purpose of this research. The test is made up of 46 elements distributed in four subtests (series, classification, matrices and conditions). For the present investigation, the test has yielded values of $\alpha = .71$, $\omega = .70$, AVE = .50 and CR = .71.

The participants answered questions related to their *age, gender, age of arrival in Catalonia, socioeconomic level and language uses* in their family environment.

Procedure

The tests were applied in specially assigned classes in the different schools to which the participants belonged. The tests were administered by trained personnel. The study was approved by the Ministry of Education of the Catalan Government (*Generalitat de Catalunya*) and both the participants, and their parents completed an informed consent that guarantees their anonymity and the confidentiality of the information collected in accordance with the ethical guidelines of the European Commission ([European Commission, 2010](#)).

Data analysis

The statistical treatment was carried out through the computer package IBM SPSS software version 26 and its AMOS extension. Spearman’s correlation statistics were used to determine the relationship between the variables studied. Likewise, in order to know the direct and indirect effects of the variables *fluid intelligence* (IQ) and *language attitudes* towards the languages of study (CAT_ATT and SPA_ATT, for Catalan and Spanish respectively) according to the research questions, and considering the particularities of the measurement instruments and the limitation of the sample size, the following path model was designed based on regression statistics ([Figure 1](#)). The age of arrival (ARR_AGE) and the linguistic competences in the heritage language (HL.PROF), in Catalan (CAT.PROF) and in Spanish (SPA.PROF) were also considered.

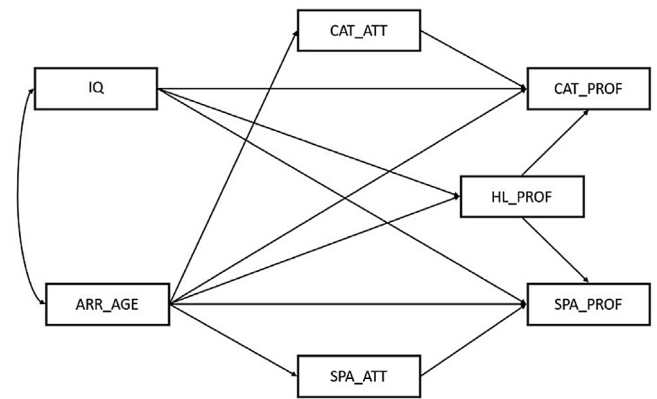


Figure 1. Path model on the acquisition of linguistic competences in Catalonia.

Regarding the reliability and internal consistency of the scales used, the psychometric coefficients Cronbach’s alpha (α), McDonald’s Omega (ω), the average variance extracted (AVE) and the composite reliability (CR) were calculated. Values of $\alpha > .70$, $\omega > .70$, AVE $> .50$ and CR $> .70$ were considered acceptable ([Hair et al., 2017](#)). In turn, to determine the consistency between the expected model and the observed model, Chi-square goodness-of-fit, Comparative Fit Index (CFI), Goodness-of-fit Index (GFI) and Root Mean Square Error of Approximation (RMSEA) statistics were used. CFI values greater than .95, GFI values greater than .95, and RMSEA values less than 0.05 are considered acceptable ([Bentler, 1990](#)).

Results

[Table 1](#) shows the descriptive statistics related to the variables that participate in the model. The scores correspond to the original values obtained in the different tests.

Spearman’s correlation statistics (see [Table 2](#)) show that the *age of arrival in Catalonia* is directly related to the linguistic competences acquired in HL and inversely related to the *attitude towards Catalan, fluid intelligence, linguistic competences in Catalan and linguistic competences in Spanish*. Regarding attitudes, while the *attitude towards Catalan* shows to be directly related to the *linguistic competences in Catalan*, the *attitude towards Spanish* does not show a significant correlation with the *linguistic competences in Spanish*. In turn, the IQ score shows a positive correlation towards the host languages of a similar magnitude for both, but it does not show a relationship with HL. Finally, the *linguistic competences in HL* show a direct correlation towards both host languages of a similar magnitude.

Path analysis

[Figure 2](#) shows the diagram of the proposed model together with its respective standardized path coefficients ($*p < .05$) and explained variance (R^2). In accordance with the criteria indicated in the data analysis section, the model shows an acceptable fit: $\chi^2 (7, N = 131) = 7.53, p = .376$; $\chi^2/df = 1.08$, CFI = .998, GFI = .984, RMSEA = .024).

[Table 3](#) shows the standardized parameters extracted from the different relations that make up the model.

Direct and indirect effects

The direct and indirect effects of the variables that contribute to the explanation of the variability observed in the level of linguistic competence of the host languages have been tested through two

Table 1
Descriptive statistics of the variables that make up the model

Measurement	Minimum	Maximum	M	SD	Asymmetry	Kurtosis
Age of arrival in Catalonia	1	16	9.35	3.03	-0.311	-0.199
Attitude towards Catalan	-10	10	4.37	4.73	-1.497	2.400
Attitude towards Spanish	0	10	6.97	2.61	-0.856	0.329
IQ (fluid intelligence)	79	132	96.92	17.25	-0.254	-0.381
Linguistic competences in HL	13.59	55.68	30.24	8.50	0.359	0.054
Linguistic competences in Catalan	15.33	53.19	33.33	8.90	-0.146	-0.868
Linguistic competences in Spanish	4.92	53.70	33.76	10.01	-0.264	-0.241

Note. M = mean, SD = Standard Deviation.

Table 2
Spearman correlation statistics between the variables that make up the model

Measurement	1	2	3	4	5	6	7
1. Age of arrival in Catalonia	-						
2. Attitude towards Catalan	-.184*	-					
3. Attitude towards Spanish	.036	-.239**	-				
4. IQ (fluid intelligence)	-.321**	.071	.004	-			
5. Linguistic competences in HL	.418**	-.047	.076	-.060	-		
6. Linguistic competences in Catalan	-.327**	.171*	.127	.258**	.363**	-	
7. Linguistic competences in Spanish	-.319**	.077	.116	.236**	.360**	.797**	-

Note. **p < .01. *p < .05.

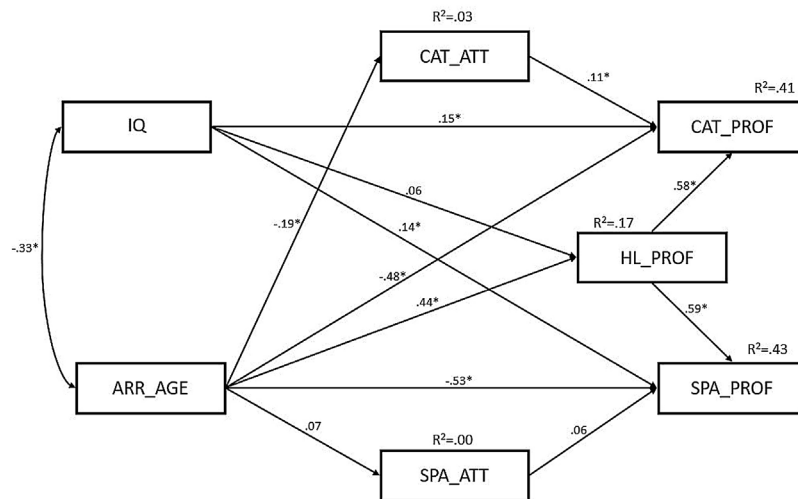


Figure 2. Final solution of the path model.

Table 3
Standardised parameters extracted from the model

Paths	β	Standard Error	CR (z)	p
CAT_ATT ← ARR_AGE	-.185	.134	-2.148	.032
SPA_ATT ← ARR_AGE	.065	.075	0.747	.455
HL_PROF ← ARR_AGE	.439	.236	5.206	<.001
HL_PROF ← IQ	.063	.042	0.784	.455
CAT_PROF ← ARR_AGE	-.478	.232	-6.031	<.001
CAT_PROF ← HL_PROF	.577	.078	7.766	<.001
CAT_PROF ← IQ	.154	.037	2.148	.032
CAT_PROF ← CAT_ATT	.107	.096	2.106	.035
SPA_PROF ← ARR_AGE	-.533	.255	-6.882	<.001
SPA_PROF ← HL_PROF	.589	.086	8.047	<.001
SPA_PROF ← IQ	.145	.041	2.052	.040
SPA_PROF ← SPA_ATT	.058	.189	1.167	.243

Note. CR (z) = Critical ratio.

structural equations, one for each language.

$$\text{Structural equation 1 : CAT_PROF} = \text{ARR_AGE} + \text{HL_PROF} \\ + \text{IQ} + \text{CAT_ATT} + e_1$$

$$\text{Structural equation 2 : SPA_PROF} = \text{ARR_AGE} + \text{HL_PROF} \\ + \text{IQ} + \text{SPA_ATT} + e_2$$

Table 4 shows the direct, indirect and total effects that the model exerts on the variable *competences in Catalan language*. All the linked variables show a significant direct effect, although this is particularly intense in the case of the variables *age of arrival* ($\beta = -.478, p < .001$) and *linguistic competences in HL* ($\beta = .577, p < .001$). However, the direct effect observed in the variable *age of arrival*, of a negative nature, is attenuated by its indirect effect, of a positive nature ($\beta = .235$).

In turn, the variables *fluid intelligence* ($\beta = .154, p = .032$) and *attitude towards Catalan* ($\beta = .107, p = .035$) exert a direct positive effect of a similar magnitude. These results suggest a facilitating effect of both variables towards the *Catalan language*. In addition, the observed indirect effects of the *fluid intelligence* variable are not significant, so *fluid intelligence* would not exert an indirect effect through HL.

On the other hand, Table 5 shows the direct, indirect, and total effects that the model exerts on the variable *competences in the Spanish language*. As occurs with the Catalan language, the direct effects of the variables *age of arrival* ($\beta = -.533, p < .001$) and *linguistic competences in HL* ($\beta = .589, p < .001$) explain to a greater extent the variability observed. Again, the indirect effect of the variable *age of arrival* ($\beta = .263$), with an opposite influence on the direct effect, causes the total effect to be attenuated.

However, while the variable *fluid intelligence* behaves in a similar way to that of the Catalan language, both in direct ($\beta = .145, p = .040$) and indirect ($\beta = .035$) effects, the variable “*attitude towards Spanish*” does not show a significant effect on *competences in Spanish*.

Discussion

With a view to answering the research questions formulated, this study has developed a *path* model which estimates the direct relationship between fluid intelligence and language attitude, and the construct linguistic competences for each of the official languages in Catalonia. In order to control the variability explained by the age of arrival and the level of competences in HL, as well as the indirect effects that arise from their relationship with the target variables, both variables have been introduced into the model.

With regard to the first research question, the results show that fluid intelligence exerts a direct and significant effect of medium-low magnitude on the level of linguistic competences in both languages. These results suggest that the cognitive elements collected in fluid intelligence act as facilitators in the learning of second languages for those young people who are in a situation of language immersion. Although these results reaffirm the theses generated by Genesee's (1976) and Sasaki's (1993) classic studies, the involvement of fluid intelligence in immersion contexts seems to be somewhat more modest. Likewise, and considering the disparate way in which these young people are exposed to both languages, the effect of fluid intelligence is similar for each language. Furthermore, fluid intelligence does not show a significant effect on HL. Therefore, the indirect effect that intelligence could have on the acquisition of second languages through its action on HL is insignificant.

Regarding the second research question, while for the Catalan language attitude shows a significant explanatory capacity of low magnitude, for the Spanish language attitude is not significant. These results partially contradict what was hypothesized, because despite the differences that could be expected due to the different ways in which young people contact each language and how they form their attitudes towards these languages, the fact that attitude could not be exerting an effect towards one of them was unexpected (Garrett, 2010).

This lack of effect for the Spanish language may be due to several reasons. The first reason would indicate that the attitude towards Spanish, developed through a mainly instrumental orientation, exerts a lesser effect on the development of linguistic competences than an integrative orientation attitude as is the case of the attitude towards Catalan (Gardner, 1985, 2001; Lapresta et al., 2010). The second reason, related to the way in which the two languages of the study are acquired, would indicate that the language acquired through contact of a more formal or academic type is more affected by attitudinal aspects than the one acquired through more informal contact. However, the failure to find an effect between attitude and competences in the Spanish language may also be due to statistical issues; the tendency to develop a very positive attitude towards the Spanish language on the part of young immigrants, observed both in this study and in other investigations (Lapresta et al., 2018), results in a variable of little variability, for which it is difficult to put its effects into evidence through regression-based analyses. On the other hand, the standard error associated with the relation between competences and language attitude for Spanish is approximately double that for the relation between competences and language attitude in Catalan; this disparity could largely explain the differences in slope and significance obtained for these relationships. Consequently, new research will be necessary to obtain more precise conclusions in this regard.

In the case of the Catalan language, the age of arrival exerts a negative indirect effect on the level of linguistic competences through the attitude towards Catalan. In other words, young immigrants of Romanian origin who arrive in Catalonia at a later age develop poorer attitudes towards Catalan, resulting in a lower level of linguistic competences in this language. This finding complements what was observed by Madariaga et al. (2013), who stated that the attitude towards Catalan is positively influenced by the length of stay. According to Lapresta et al. (2010), this decline may be related to issues of self-identification, since young people who have spent longer in the host country will feel more identified with it, and their attitude towards the language, and towards the rest of the cultural elements of that territory will be more positive.

Although these results highlight the facilitating role of fluid intelligence and attitude in language learning of immigrant students in Catalonia, it is important to highlight that these variables provide a relatively modest explanation for the variability observed. The variables age of arrival and, especially, the level of competences in HL, explain this variability to a greater extent, making the model as a whole reach an explanatory capacity of 43% for the Spanish language and 41% for the Catalan language, in the application of a linear model. According to the data obtained, the way in which these variables operate on the level of linguistic competences is interactive: the variable age of arrival has a direct, intense and negative effect on the level of linguistic competences in both languages, a logical result if we consider that young people who arrive in Catalonia at a younger age are in contact with the host languages for a longer time. However, young people who arrive in Catalonia at a later age will have prolonged their learning in HL; therefore, according to the principles of interlinguistic influence (Cummins, 1979; Odlin, 1989), their ability to transfer knowledge from the HL to the host languages is higher. Thus, the effect of linguistic interdependence causes the total effect of the

Table 4
Direct, indirect and total effects on *competences in Catalan language*

Linguistic competences in Catalan (R ² = .411)	Direct effects	Indirect effects	Total effects
Age of arrival	-.478*	.235*	-.243*
Linguistic competences in HL	.577*	-	.577*
IQ (fluid intelligence)	.154*	.034	.188*
Attitude towards Catalan	.107*	-	.107*

Note. *p < .05.

Table 5
Direct, indirect and total effects on *competences in Spanish language*

Linguistic competences in Spanish (R ² = .428)	Direct effects	Indirect effects	Total effects
Age of arrival	-.533*	.263*	-.140*
Linguistic competences in HL	.589*	-	.589*
IQ (fluid intelligence)	.145*	.035	.180*
Attitude towards Spanish	.058	-	.058

Note. *p < .05.

age of arrival to be reduced by almost half. Consequently, the phenomena of interlinguistic influence are an element of compensation for the linguistic disparity produced by the age of arrival.

In short, this study shows how the acquisition of the Catalan language, generally used as vehicular language in learning other academic content, is influenced by intellectual and attitudinal elements through an effect of similar intensity. In the case of the Spanish language, acquired to a greater extent through informal practice, while fluid intelligence exerts an effect of similar magnitude to the effect observed in the Catalan language, the effect of the language attitude is statistically unclear. Consequently, it is recommended to interpret these results with caution until new studies can confirm the lack of effect observed.

It is also important to point out that the study has a number of limitations that must be considered. In the first place, the sample size is relatively small, so elements such as the standard error associated with some of the predictions and the low variability of some variables, have a greater capacity to distort the effects that actually occur. Secondly, the sample used is made up only of young people whose HL is Romanian, a Romance language of the Indo-European family that in its formal aspects is relatively close to Spanish and Catalan. It is possible that, in typologically more distant languages, where the effect of HL on the learning of second languages is different, aspects such as fluid intelligence and language attitude have a more notable relevance. Finally, the characteristics of this study do not allow us to ascertain how these relationships vary with time. Future research should seek to study this phenomenon through longitudinal designs to obtain additional information in this regard.

These results contribute to explain the variability observed in the acquisition of second languages by immigrant students in a context of linguistic immersion, highlighting the facilitating, but non determining role of the variables intelligence and language attitude. Consequently, the present study proposes fluid intelligence as an element to consider, as well as the attitude towards the target language as an element to promote in linguistic immersion programs aimed at young immigrants.

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