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The Unexpected



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Editors' Foreword

The Unexpected

This fourth issue of *Jakobsleiter* is dedicated to the theme of the “unexpected”. And it is indeed full of unexpected themes, ranging from astrophysics, to sociology, from the history of education to that of pop music, and many more. For me, the term unexpected goes beyond qualifying the themes of this volume’s contents. It also characterises the joy I feel, when I consider *Jakobsleiter*’s development over the years. The idea of a peer-reviewed, English-speaking, multidisciplinary journal dedicated exclusively to high-school students from Hungary was ambitious, but it was met immediately with a huge amount of support and encouragement from students and colleagues near and far.

It is a pleasure to see that by its fourth year, *Jakobsleiter*’s dare—the challenging task of producing peer-reviewed articles during one’s high-school years—is able to attract a promising number of applicants. Their ideas are dazzling and refreshing. Year after year, colleagues here at the institute dedicate immense time and energy to help would-be authors to improve their writings, and high-profile university professors in far-away institutions are also willing to offer advice in the form of supportive and constructive peer reviews. Just like in previous years, the combination of all these scholarly efforts resulted in a very serious publication.

Last year’s trend of a growing interest among authors in matters of mental health and environmental factors affecting it continued to manifest this year. Zsófia Kristóf focused on how perceived levels of loneliness relate to

channels and patterns of communication. Léna Bognár's article, on the other hand, tackles the challenging but sadly relevant topic of the interrelation between parental divorce and teenage aggression. On the matter of physical well-being, Leó Gulyás-Gorka's article offers a new perspective. It examines whether gender plays a role in one's approach to forms of complementary and alternative medicine.

This issue of *Jakobsleiter* also offers a great selection of articles about cultural and social questions. Kincső Balogh studies the ways in which western pop music influenced the musical tastes and value choices of generations of youth in socialist Hungary. Bendegúz Ruskal compares the efficacy of financial and non-financial tools in supporting Roma students in Hungary. Áron Kratochwill's article focuses on the pedagogical ideals of Robert Owen and their potential influence on later thinkers, such as Friedrich Fröbel.

There are also articles focusing on economic matters. Zhang Wenbo (Bruce)'s contribution revolves around the calculation of the fuel requirements of a would-be Mars mission. Dai Xin (Kelly) analyses the political and economic circumstances contributing to BYD's business expansion in Hungary.

Allow me to conclude this foreword by an homage to a dear colleague, and a major, yet often unseen contributor of *Jakobsleiter*. I would like to dedicate this fourth issue to Masha Semashyna, who has been *Jakobsleiter*'s editor in the last two years and who has been the driving force behind the creation of this fourth issue as well. It is with this expression of gratitude that I call the readers to an exploration of the unexpected!

Andor Kelenhegyi

ZSÓFIA KRISTÓF

The Loneliness Epidemic: The Relationship between Perceived Social Support and Preferred Method of Communication

Introduction

The exponential rise of technology usage has altered our world in several ways, one being the way we view relationships and how we, in turn, participate in them. Some claim that there is an ongoing “loneliness epidemic”. This phenomenon was first identified by Robert D. Putnam in 2000 and this phrase refers to the sudden expressed rise in loneliness over recent years. Our screens are engineered to draw us in, and it is important to examine how much this isolates us from reality and how damaging it can potentially be for our relationships. Though some people deny this issue’s prevalence, it is a topic worth caring about because of the potential consequences. Human relationships are one of the core foundations of our world and in spite of this, the quality of them is often neglected, which is what leads to perceived loneliness or a low level of perceived social support.

Loneliness can be defined as “a distressing feeling that accompanies the perception that one’s social needs are not being met by the quantity or especially the quality of one’s social relationships” (Hawkey & Cacioppo, 2013, p.1). There is a direct relationship between loneliness and perceived social support: loneliness aligns directly with low perceived social support (Salimi & Bozorgpour, 2012). Perceived social support refers to “how individuals perceive friends, family members and others as sources available to

provide material, psychological and overall support during times of need” (Ioannou et al., 2019, p.2). The reason that social support is referred to as perceived social support in this study is because research has found that actually *received* social support has a way smaller impact than *perceived* social support on overall well-being (Haber et al., 2007, emphasis added). Loneliness or a low level of perceived social support occurs when a person feels as if their social needs are not met and sufficient communication should help avoid the occurrence of loneliness, especially discussions about needs.

The aim of my paper, however, is to investigate the relationship between one’s preferred method of communication and their perceived social support. I believe this is relevant because, in order to stop the loneliness epidemic, we need to identify its causes and explore potential solutions. Therefore, mapping the relationships of perceived social support with other external factors is crucial.

The Loneliness Epidemic

It is a very widely accepted fact that love and belonging are fundamental human needs—as established by Maslow in 1943 through a framework recognised in psychology even today. Any type of connection and communication is better than none, and no one should be deterred from building relationships purely because they might not be perfect. In as early as 1998, a study described “the internet paradox,” a term coined because, despite participants’ extensive internet use for communication, which had been expected to yield positive social outcomes, the study’s findings showed the opposite (Kraut et al., 1998). After receiving critique from multiple directions (Shaw & Gant, 2002), the internet paradox was revisited. The results suggested that those who start with an advantage accumulate more over time—in this case, extroverts were able to build relationships quicker and reported decreased feelings of loneliness and an increased sense of community over time, while introverts reported the opposite (Shaw and Gant, 2002). This could be explained by the fact that developing strong bonds online is difficult, and online communication is mostly used to sustain relationships already built in the real world. This study also found a statistically significant positive correlation between internet usage and increased level of stress in daily life.

Indeed, despite communication becoming more accessible for everyone through online means, loneliness rates are undeniably rising. The site Mastermind Behavior (2024) claims that in the demographic of young adults aged 18–24, the loneliness rates are rising, with 59% of the interviewed participants acknowledging its negative effects on their well-being. This is especially concerning, considering that young adults are the demographic with the most access to people. Being an impactful environment, schools inevitably affect children's development, and in schools, multiple systems are in place to foster relationships and the social development of children (Eccles & Roeser, 2006). If even in settings like this, there is a rise in the rates of loneliness, that implies even worse for demographics whose surroundings do not provide extra support with fostering relationships, such as the elderly who generally live in more isolated conditions. Though it is beneficial that they have access to online communication, that access often replaces in-person communication, and this could have unintentional negative effects. One study from Poland conducted during the Covid-19 epidemic found that two out of three participants experienced loneliness, and people over the age of 60 displayed higher levels of loneliness, as well as other symptoms of worse mental well-being than younger people (Dziedzic et al., 2021). Although there could be other contributory causes for these results, it is fair to conclude that perceived loneliness is prevalent in a state of physical isolation—even with our level of access to online communication platforms today.

There are many concerns when we talk about the consequences of loneliness. There may be damage to a person's physical health, as stated in a U.S. Surgeon General's advisory (2023) on the healing effects of social connection and community: loneliness and social isolation increase the risk for premature death by almost 30%, or as much as smoking up to 15 cigarettes a day. Other studies have also found a positive correlation between loneliness and mental health problems, such as depression, Alzheimer's disease, alcoholism, child abuse, bereavement, chronic stress, suicide, personality disorders and issues with sleeping (Musthaq et al., 2014). In contrast, higher levels of perceived social support have been associated with higher levels of self-compassion, which consequently leads to a higher level of well-being altogether (Tannous-Haddad et al., 2024). There have been attempts to "cure loneliness" with different methods like a nasal spray of oxytocin; this,

however, did not produce sufficiently positive results. A *New York Post* article stated that although the oxytocin hormone caused a decrease in loneliness in the short term, it did not drastically impact long-term measures like generally perceived loneliness (Beard, 2025). This is an interesting finding, but not enough to actually combat the serious issues of loneliness—thus, it is important to explore further potential mitigating factors.

Perceived Social Support and Methods of Communication

The effectiveness of online communication overall has been debated through multiple studies (Bonetti et al., 2010; Ioannou et al., 2019; Kraut et al., 1998, 2002; Tannous-Haddad et al., 2024). Online communication can offer convenience, anonymity and access to a vast majority of people with whom you are able to form connections. However, how social media sites actually affect people's well-being and social connections is unclear. Some studies have found that increased use of social network sites is associated with higher levels of loneliness (Wang et al., 2018)—suggesting that a correlation exists. However, the direction of this relationship is unclear. It is possible that this is due to the bi-directional nature of this phenomenon. There are studies that say that the internet can provide a platform for social support against loneliness (Bonetti et al., 2010; Shaw & Gant, 2002; Tannous-Haddad et al., 2024), others that say spending a lot of time on social media hurts relationships (Ioannou et al., 2019; Kraut et al., 1998, 2002), and ones that show that social media is a great tool for maintaining already existing or establishing new relationships (Bonetti et al., 2010; Shaw & Gant, 2002; Tannous-Haddad et al., 2024).

As online communication becomes more prevalent, it is crucial to understand its impact on social support. If online interactions do not provide the same depth of support as in-person communication, individuals may unknowingly rely on a method that does not completely meet their social needs, causing potentially significant problems with well-being.

When talking about loneliness, it is important to take context into consideration as well. One study conducted in Hungary found that 56% of Hungarians experience loneliness, which puts Hungary in 7th place among European nations with the highest levels of loneliness (STADA, 2024). A surprising finding from this health report is that in Europe overall, 63%

of people aged 18–34 report feeling lonely—although they should be the most connected demographic (STADA, 2024). These results might be a consequence of too little data collected from other demographics due to them being more inaccessible, but it could also simply be due to an excessive amount of time spent online by adults and young adults. In a study conducted in Hungary it was found that 15.6% of students in 5th, 7th, 9th and 11th grades feel lonely all or most of the time feel lonely, while about a third of the participants feel lonely sometimes, and about a fourth never experiences the feeling of loneliness (Németh, 2024). The findings in this study also show that the rates of loneliness are significantly higher in the 9th and 11th grades compared to the 5th and 7th grades. Unfortunately, in this study social media or technology usage was not measured, therefore its relationship to the rates of loneliness cannot be assessed. It is crucial to determine, however, the relationship between online communication and perceived social support in Hungary.

Research aims and hypotheses

The aim of this research was to test the hypothesis that people whose preferred method of communication is in person will have higher levels of perceived social support than those whose preferred method of communication is online. This would indicate that online communication usage—regardless of its easy and comfortable nature—has a negative connection to our personal relationships. However, it does not necessarily imply a direct causal relationship, as people with lower levels of perceived social support could lean towards online communication so as to search for the support they are lacking in real life.

The goal of this study was to assess the relationship between perceived social support and preferred method of communication, with the purpose of understanding what could help in the prevention of perceived loneliness. In order to do so, this study also explored how other factors, such as gender and age, contribute to perceived social support scores and preferred method of communication. It has previously been suggested by the media that men's perceived social support is significantly lower than women's leading to the phrase: "male loneliness epidemic" (Greenfield, 2025). Men are often socialised to suppress emotions and avoid self-disclosure (Rive-

ra & Scholar, 2020) which can hinder the recognition of perceived social support (Chen et al., 2021). Men and boys have indeed been found to tend to prefer online communication—a central connecting point for males being video games; they communicate with each other more online because of the growing popularity of video games among younger boys especially. Online conversations have also been found to be different in nature as men often tend to play to win, whereas women often tend to play as a social activity (Terlecki et al., 2011). Assuming that younger generations' level of technology usage is higher, since most young people now grow up in close proximity to digital devices, their communication habits might also revolve more around using the online space. For perceived social support and age the demographic with the best scores is assumed to be students because, as mentioned in the introduction, schools as developmental centres aim to support the social lives of pupils (Eccles & Roeser, 2006).

Methods

This study used an online questionnaire to measure participants' levels of perceived social support and preferred method of communication. 93 participants from Hungary between the ages of 14 and 62 were recruited using snowball sampling ($M_{\text{age}} = 22.66$, $SD_{\text{age}} = 12.08$). 65.59% of the participants were female.

To measure perceived social support, the Multidimensional Scale of Social Support (MSPSS) (Zimet et al., 1988) was used. This scale includes 12 items and the responses to these are rated on a 7-point Likert scale, measuring level of agreement to the prompt. The 12 items are the sum of four items in three sub-scales for significant other, family and friends. Through a psychometric MSPSS validation study created by Zimet and his research partners, Papp-Zipernovszky, Kékesi and Jámbori determined that the test had good internal reliability in Hungarian as well (Papp-Zipernovszky, Kékesi & Jámbori, 2017). In the present study, a total perceived social support score was used in analysis by adding up all items of the questionnaires and then calculating averages.

To measure preferred method of communication, six situational questions, five of them specific and one a general question ("You're feeling really happy/really sad about something or you just feel you need to communicate

with someone for any reason about either your or their situation. Which are you more likely to do?”) were included in the survey—these were developed for this specific study. The participant needed to choose from two prewritten options implying whether they are more likely to communicate online or in person.

This research was approved by the Milestone Research Ethics Committee.

Results

All analyses in this paper were conducted using JASP version 0.95.4 (2025). According to the data, there seems to be a tendential difference in perceived social support between those who prefer online communication ($M = 5.43$) and those who prefer in-person communication ($M = 5.64$). More specifically, those who prefer online communication tend to feel less socially supported than those who prefer in-person communication. In order to test whether this difference is statistically significant, an independent samples t -test would have been conducted. However, since the Shapiro-Wilk test revealed a deviation from normality, a Mann-Whitney U test was conducted instead. This revealed that the difference between the two groups is not significant ($W = 880.50$, $p = 0.18$).

Table 1 *Perceived Social Support and Preferred Method of Communication*

Perceived Social Support Score		
	Online communication (n = 39)	In-person communication (n = 54)
Mean	5.43	5.64
Standard Deviation	0.99	1.13

Data gathered shows that both the females and males surveyed have a higher preference for in-person communication on average (see Table 2). Since preference for online communication was assigned 0 in value and preference for in-person communication was assigned 1 in value, a result below 0.5 would have meant a higher preference for online communication on average. As the results were above 0.5, this indicated a higher preference

for in-person communication on average. Females surveyed had a slightly stronger preference for in-person communication (by 0.03), so in order to test whether this difference in preferred method of communication for the two genders is meaningful, we would have needed to conduct an independent samples *t*-test. However, the Shapiro-Wilk test once again revealed a deviation from normality, therefore a Mann-Whitney U test was conducted instead. This showed that males and females do not differ significantly in their preferred method of communication ($W = 1003$, $p = 0.802$).

Table 2 *Gender Difference in Preferred Method of Communication*

Preferred Method of Communication		
	Female ($n = 61$)	Male ($n = 32$)
Mean	0.59	0.56
Standard Deviation	0.50	0.50

Note: in this study, online communication was assigned 0, and in-person communication was assigned 1 in value.

In order to test whether there was a gender difference in perceived social support, an independent samples *t*-test would have been conducted. However, the Shapiro-Wilk test revealed a deviation from normality, so a Mann-Whitney U test was conducted instead. This showed that the difference between the genders in perceived social support is not statistically significant ($W = 1036.50$, $p = 0.627$).

Table 3 *Gender Difference in Perceived Social Support Score*

Perceived Social Support Score		
	Female ($n = 61$)	Male ($n = 32$)
Mean	5.56	5.53
Standard Deviation	1.14	0.95

From the data in Table 4, we can conclude that the average age of people who prefer online communication ($M = 20.64$) is lower than the average age of those who prefer in-person communication ($M = 23.87$). In order to test whether this difference is statistically significant, an independent

samples *t*-test would have been conducted. However, the Shapiro-Wilk test revealed a deviation from normality, so a Mann-Whitney U test was conducted instead. This revealed that the age difference between those who prefer online or in-person communication is not statistically significant ($W = 991.50, p = 0.615$).

Table 4 Preferred Method of Communication Difference in Age

Age		
	Online communication ($n = 39$)	In-person communication ($n = 54$)
Mean	20.64	23.87
Standard Deviation	10.28	13.13

Discussion

The aim of this study was to determine the relationship between preferred method of communication and perceived social support. According to the results, perceived social support seems to be higher for those who prefer in-person communication to online communication, however, the difference is not statistically significant—therefore the original hypothesis was not supported by the data. This finding is compelling, since it suggests that the relationship between method of communication and perceived social support is not as straightforward as often considered. Online communication is not overall harmful, and is rather simply an alternative to in-person communication. The findings in this research align with findings from other previous studies that suggest online communication is capable of being helpful and positive and just as important as in-person communication (Bonetti et al., 2010; Nowell & Boyd, 2010; Shaw & Gant, 2002; Tannous-Haddad et al., 2024).

The results also suggest a potential generational divide with younger people communicating more online, however, this difference is also not statistically significant. Here it may be important to consider that the participant pool consisted mainly of people between the ages of 16 and 19, therefore the data for this demographic can be considered more accurate

than for other age groups. Since the questionnaire was online, everyone had to have some sort of access to a digital device to take part in the study, therefore it might also be assumed that all of them use some sort of a digital device regularly. Currently 93.4% of people who use the internet also use social media (Khoros, 2024), and over 6 billion people use the internet (DataReportal, 2025). Amongst the baby boomer generation, 36.9 million people use social media (Khoros, 2024), which is about half of all members in that generation (Field, 2025). Social media use and online communication are becoming something that affects all generations in our world, not just the youngest ones, since digital communication networks have been available for long enough and are becoming more and more accessible to everyone. With the current technological advancements, smartphones and other devices with online capabilities are integrating exponentially into the daily lives of most. Younger demographics are especially sensitive to this, due to them growing up in a world where the current standard is constant proximity to a technological device, but those who used to be considered younger demographics are now growing into adults and slowly forming into an older demographic. Consequently, our findings could reflect shifts in communication styles with the development of technology and the virtually unlimited access to online platforms. While this shift may bring certain benefits, it is important to consider the potential disadvantages and also the long-term effects of primarily digital communication on social relationships and well-being.

Additionally, even though some gender differences in the preferred method of communication were observed, further research would be necessary to make claims about whether gender significantly impacts preferred method of communication or perceived social support, because statistical analysis did not support this theory.

This applies similarly to gender differences in perceived social support. An interesting discovery in the results is that females reported a slightly higher preference for in-person communication and they also had slightly higher perceived social support scores, which is aligned with the original hypothesis, but surprising—taking into consideration the findings of a previously mentioned Hungarian study which looked at the student demographic and found that high school girls showed the highest levels of loneliness (Németh, 2024). Considering these different findings, it makes

sense that the data found in this research was not statistically significant since it appears to be primarily dependent on the group at hand and its social and cultural background, and a bigger participant size would be necessary to make a claim about gender differences in perceived social support score.

The data found in this study aligns with some previous research (Bonetti et al., 2010; Kraut et al., 1998, 2002) that claims that use of social network sites or online communication sites is associated with loneliness. The nature of this relationship is likely bi-directional in nature, meaning that both variables can influence each other in a cycle, making them both potentially causes and effects. In some cases, online communication does not provide enough perceived social support and in others, those who have a lower sense of perceived social support could choose to participate more in on-line communication.

For example, a study done by Bonetti and his research partners (2010) found that children and adolescents who reported loneliness communicated more online compared to those who did not report loneliness. This might imply that a lower level of perceived social support can lead children to reach towards online communication as a safety net or an attractive world with a broad range of different communities in which they can find their place without the pressure of complete presence. However, it is also possible that children who spend more time online tend to feel lonelier than their peers.

There have, however, been studies (Kraut et al., 1998, 2002) that have found direct results for harm from online communication. A study conducted by Mu Hu in 2009 found that the feeling of loneliness actually increased after having participants chat online and that these participants experienced stronger feelings of loneliness as opposed to others who chatted face to face. These results show that initial feelings of loneliness do not subside after online communication. In fact, for some, it might worsen that sense of isolation. In this case, utilising online communication in excess can not only be regarded as the least optimal form of communication but as an actually harmful form of communication.

The results of this current study as well as previous ones highlight the importance of maintaining a balance between online communication and being present in real-life social settings to support well-being. The internet

and online communication is not the enemy—imbalance is. We need to promote real-life communication in order to maintain this balance, and there are a multitude of ways to do so.

Conclusion

The rising rates of loneliness, or the “loneliness epidemic”, highlight the urgent need to examine how different communication methods impact social well-being. This study found no significant difference between how online and in-person communication relates to perceived social support. With rapid technological advancements, whether someone prefers it or not, online communication is on the rise, therefore it is crucial to try and assess its potential and limitations in fostering meaningful social connections and providing sufficient support. To promote well-being, individuals and policymakers must take proactive steps to preserve and encourage personal interactions, whether they be in person or online.

Moving forward, further research is needed to explore this topic in greater depth. Social relationships are fundamental to both personal development and well-being. As the use of online platforms is growing, focus should be on making them platforms which allow for positive interactions and discussions, especially as the findings suggest that any kind of communication relates similarly to perceived social support. Addressing the loneliness epidemic requires collective action, and prioritising meaningful relationships should be a societal imperative, whether these relationships take place online or offline.

Limitations

Future studies should aim to provide deeper insights into long-term trends of communication preference regarding perceived social support. In parallel, future research should aim to uncover how technology use has impacted the nature of relationships on a bigger scale. It should aim to examine a broader and more diverse group as the limitations of this study include its relatively small, therefore less representative sample size, which is likely to also be a contributor to the results not being statistically significant. Worth mentioning is that online communication can in some cases actively al-

leviate loneliness, and increase levels of confidence (Shaw & Gant, 2002). Online platforms can indeed also provide a very diverse safe space where people can often anonymously explore different parts of their identities (Shaw & Gant, 2002), which is why it would be important to study more diverse groups of people in the future as well.

Another limitation of this study that is important to consider is its use of self-reported data. In the case of perceived social support, the biases do not cause implications since, as established early on in this paper, in the case of social support the individual's subjective perception of support is what actually matters. However, reporting the preferred method of communication may introduce biases, which impact the data's reliability. Simultaneously preferred method of communication is particularly difficult to work with because one's preferred method of communication might not be exactly aligned with their most often applied method of communication.

The cross-sectional, correlational design of the study is also one of its limitations, as the sample is not representative, which makes generalisation impossible, also contributing to results that are not statistically significant.

Practical action points

Individuals should prioritise interaction and focus on providing platforms to any form of communication to assist relationships. For in-person communication, openness in social settings and placing yourself into those settings is also an important step. This way you are contributing to others' social life as well as your own. Individuals should also all aim to create a safe space in social settings because not only is it more comfortable for them but for others—being open and social can often bring about a chain reaction.

Society and policymakers should encourage the design of more third places such as parks. Third places are places outside of where you live or work and they “act as a core setting for informal public life, offering connection, community, and sociability” (Oldenburg, 1989). If third places are designed considerately, not only are they a place of socialisation, they provide other advantages as well such as space for creativity or exercise. Community engagement and promotion of community events as well as group activities is key. Clubs are a great place for the promotion of socialisation,

and some can even be established cost-free, such as running clubs. Research has found that community engagement enhances perceived social support in more than one way (Nowell & Boyd, 2010). Not only do we fulfil our personal need of belonging but we can also align our values and take on a sense of responsibility, creating community for ourselves as well as others.

Promoting in-person interaction is key, but so is the enhancement of digital literacy. Since technology is developing so rapidly, not everyone can follow along. Guided platforms that promote positive interactions and communication between people should be developed and refined to make online spaces welcoming and comfortable. To ensure safety and promote better internet use, more organised digital education should be implemented. Most relationships and communities now exist both online as well as offline, and to be able to be full-fledged members of groups in today's world people need basic technological skills. There have been multiple studies that found a positive correlation between digital literacy and well-being, as well as decreased amounts of self-reported loneliness (Jang & Je, 2022). Besides the need for basic technological skills, the promotion of digital literacy is crucial to ensure online safety in order to make the digital social space as secure and welcoming as possible. Finding small, practical actions that everyone can implement to support both their own and others' well-being is key. This ensures that, instead of feeling purely overwhelmed, people can take meaningful steps toward change.

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Appendices

Appendix 1: Multidimensional Scale of Social Support Questions (Zimet et al., 1988)

1. There is a special person who is around when I am in need.
2. There is a special person with whom I can share my joys and sorrows.
3. My family really tries to help me.
4. I get the emotional help and support I need from my family.
5. I have a special person who is a real source of comfort to me.
6. My friends really try to help me.
7. I can count on my friends when things go wrong.
8. I can talk about my problems with my family.
9. I have friends with whom I can share my joys and sorrows.

10. There is a special person in my life who cares about my feelings.
11. My family is willing to help me make decisions.
12. I can talk about my problems with my friends.

Appendix 2: Questions to determine preferred method of communication in survey

1. You have a conflict with someone close and feel the need to address it to resolve any tension. What do you do?
2. You've noticed someone struggling with their mental health and want to offer help. What do you do?
3. You've gone through something upsetting and/or emotionally painful and feel the need to share your feelings with someone close to you. What do you do?
4. You've realised something deeply personal about yourself and want to open up to someone you trust. What do you do?
5. Something amazing happened to you and you're happy and excited. You would like to share this with someone close to you. What do you do?

The generalised question below which was used directly for data:

You're feeling really happy/ really sad about something or you just feel you need to communicate with someone for any reason about either your or their situation. Which are you more likely to do?

Response options to each question were:

I am more likely to talk to them about it online.

I am more likely to talk to them about it in person.

LÉNA BOGNÁR

The Impact of Parental Divorce on Teenage Aggression

Introduction

In Europe, the total number of divorces in 2024 was nearly 130,000 (Eurostat, 2025), therefore it is essential to address the possible links between parental divorce and its potential psychological effects on children. This article focuses on three interconnected aspects: the possible relationship between parental divorce and aggression among adolescents, the possible influence of the timing of the divorce on aggressive tendencies, and the coping mechanisms that teenagers use to adapt to these changes. Having reviewed the contexts of studying aggression, the article discusses the research I conducted on the impact of parental divorce on students from my school and from Milestone Institute. Following international examples, I used the Buss and Perry Aggression Questionnaire (BPAQ) (Buss & Perry, 1992) to measure the participants' aggressive tendencies.

On the one hand, I found that, contrary to my hypothesis, teenagers with intact families have higher aggression scores than teenagers with divorced parents. On the other hand, my second hypothesis, namely that teenagers who experienced divorce in the last five years exhibited higher aggression scores than those who went through divorce earlier, was proven to be correct. The data I have collected on coping strategies, such as relying on time, therapy or self-help, as well as literature on communication within the family helped me explain my results.

Parental divorce and its psychological consequences

The rise of divorce and changing views in the Western World

According to Wilcox and his colleagues' findings, divorce became more accessible and socially acceptable, causing rates to more than double between 1960 and 1980 in the United States (Wilcox, 2009). The rates went from 9.2 divorces per 1,000 married women to 22.6 divorces per 1,000 married women, affecting nearly half of the children born in 1970. The psychological revolution of the late 20th century, driven by post-war wealth, shifted the view of marriage from a duty-centred partnership focused on family stability, to believing that children would benefit from their parents leaving unhappy marriages. However, since 1974 about 1 million children per year have experienced parental divorce, putting them at a two or three times higher risk for psychological malfunction such as aggression, anxiety, or stress.

Similarly, in Hungary, divorce rates have risen since the end of communism in 1989, from 25% to 31% (Györgyi, 2018). Most recently, in 2024 the divorce rates were around 18,000 divorces in Hungary (KSH, Hungarian Central Statistical Office, 2025). While divorce is associated with several negative psychological effects on youth, it remains debated whether those are direct effects of divorce or other underlying factors influence them as well (Wilcox et al., 2009). Moreover, McLanahan and her colleagues have found that 11% of boys coming from divorced families end up spending time in prison before the age of 32, while only 5% of boys coming from intact families do (McLanahan et al., 1994). This means that divorce is a common experience, which many children share, and which is associated with psychological issues, making it essential to address this topic.

Psychological and environmental factors of divorce

Divorce brings significant changes to one's life on many levels—for example, in living arrangements, which could potentially affect the children mentally and physically (Behrman et al., 1994). Children who live in two homes have a different sense of “home” compared to those who live with married parents in a single household. Additionally, moving between two houses requires children and teenagers to pack their belongings regularly as they transition between each parent's home. Moreover, divorce can affect

the financial status of the family, which could put minors in a vulnerable position (Behrman et al., 1994).

Divorce may be a significant source of stress in children's and teenagers' lives. After the separation, many children experience signs of aggression, anxiety, stress, and anger (Behrman et al., 1994). These emotional and behavioural reactions can be explained as direct consequences of the disruption in the family environment and the resulting uncertainty (Lee et al., 2000). Moreover, children may blame either themselves or their parents for the occurrence of divorce (Lee et al., 2000), which may aggravate the distress. It is therefore essential for parents to reassure their children that they are not responsible for the divorce, and both of their parents will continue to love them (Lee et al., 2000).

Children usually overcome parental divorce by adapting to the emerging situation, and the majority of the children whose parents divorce do not have long-term adjustment problems (Lansford et al., 2009). However, the time that the process may take varies from person to person (Behrman et al., 1994). Many factors can impact the way that a child or teenager is affected by divorce, as the child's or teenager's mental well-being can range from poorer to better than it was before divorce. Variables that are supposed to be considered are parenting skills, custody, interparental conflicts before and after, moving, changing schools, and remarriage (Behrman et al., 1994). One of the most important factors is the way parents handle divorce and provide understanding, stability, and support (Lee et al., 2000). Furthermore, children with divorced parents are at a greater risk of externalising behaviours, internalising problems, poorer academic achievement, and problematic social relationships (Lansford et al., 2009). The divorce-stress-adjustment perspective indicates that divorce can often be associated with creating significant turmoil, however, as mentioned before, individuals differ greatly in how they respond (Amato, 2000). This framework also emphasises the protective factors that can buffer children from negative effects (Amato, 2000).

Correlation between the ages of children and divorce

In comparison with older teenagers, young children may be less capable of realistically evaluating the divorce, therefore they are more likely to blame themselves and are less able to cope with it successfully (Lansford et al.,

2009). Divorce may have developmental stage-specific effects, depending on when it occurs (Lansford et al., 2009). For example, divorce during adolescence may affect academic achievement, identity development, and forming romantic relationships, since these areas of functioning are developmentally essential at this age (Lansford et al., 2009). For teenagers, the hardest part of the divorce is the first year following the event (Salahian et al., 2021), and the longer time passes after the divorce, the more likely the children are to adjust to the emerging new situation (Lansford et al., 2009).

Results of an existing case study

As mentioned before, parental divorce is linked to mental challenges that teenagers or children must face. Divorce often disrupts the stability of a teenager's home and mental health, leading to experiencing insecurity, stress and often anxiety. These emotions can manifest as externalising behaviours, such as aggression (Campbell et al., 2000). The term "externalising behaviours" refers to a group of behaviours which are demonstrated in one's outward behaviour, causing harm to the environment (Campbell et al., 2000). Beyond externalising behaviour, research draws attention to the fact that children of divorced parents are more likely to develop maladaptive coping strategies (Neher et al., 1998). A longitudinal study reported that children five years after the divorce reported more substance-using friends and less developed coping skills than children from intact families (Neher et al., 1998). Therefore, gaining a deeper understanding of how divorce is associated with the mental well-being of teenagers is crucial in finding out more about the link between increased aggressive tendencies and parental divorce. It also seems relevant to explore the ways in which the social environment influences the experience of divorce as well as the manifestation of aggression.

Environmental influences on aggression levels

Perception of aggression

In social psychology, aggression is most commonly defined as a behaviour that is intended to harm someone else who is motivated to avoid that harm (Bushman & Huesmann, 2010; DeWall, Anderson, & Bushman, 2012, as cited in Allen et al., 2017). Moreover, researchers also distinguish be-

tween *reactive aggression*, where one responds impulsively to provocation, and *proactive aggression* which is more goal-oriented (Dodge et al., 1987). Aggression may take many forms as well, such as verbal and physical aggression, hostility and anger, which will be assessed in this study using the Buss and Perry Aggression Questionnaire, BPAQ (Buss & Perry, 1992).

Learning aggression

It is essential to take external factors into account when discussing the various aspects of aggression. Many behaviours are learned by imitating others, that is, many children learn aggression through observational learning. This learning happens either intentionally or unintentionally, depending on the influence of the example (Lefkowitz et al., 2013). Children's primary sources of social learning are family members, social groups, and symbolic modelling (Shaffer & Kipp, 2013), such as media or video games. Consequently, children who come from families where aggression is a common phenomenon are more likely to display aggressive behaviour (Labella & Masten, 2018). Moreover, peer groups, according to Jean Piaget, may contribute as much if not more to children's or teenagers' development as adults do (Harris, 1998, 2000; Shaffer & Kipp, 2013; Youniss, McLellan, & Strouse, 1994). Entering school opens the door for children to spend most of their time with their peers, who are described as social equals, with the same complexity and similar goals (Lewis & Rosenblum, 1975; Shaffer & Kipp, 2013). In this sense, they are not like parents, who may hold power over children, but rather they have equal status, so children have to learn to cooperate, compromise, and get along in order to achieve shared goals (Shaffer & Kipp, 2013).

Furthermore, children learning aggression from each other and their parents could be illustrated by the Bobo doll experiment conducted by Bandura and Ross in 1961 (described in Everaert et al., 2014). In this experiment, children were seated in a room with toys to play with, while an adult in the same room interacted with the Bobo doll. The adult either interacted with the doll aggressively or ignored it. Next, the children were introduced to a situation designed to create mild frustration, and then they were placed with a doll similar to the one they saw an adult interacting with earlier. By assessing the children's aggression levels before the experiment, the researchers observing the children's behaviour ensured that any

observed aggression was not due to preexisting tendencies. The results of the experiment showed that the children who saw the adult in a violent context were more aggressive than those who did not, or than the control group (Everaert et al., 2014). This suggests that witnessing aggression influenced the children's aggression levels, which supports Bandura's social learning theory, according to which children learn social behaviours, such as aggression, by imitating (Everaert et al., 2014). However, it is essential to mention that imitation is not required in order to adopt aggression, it is enough to merely observe aggressive behaviour (Benjamin et al., 2015). Furthermore, research shows that antisocial behaviour is often learned from parents, and also that antisocial parents are more likely to divorce (Lahey et al., 1988). This emphasises the significance of parental influence on the development of aggressive behaviour among children and teenagers.

Occurrence of aggression

Aggression may stem from the experiences from early connections (Sroufe et al., 2005). The *Minnesota Study of Risk and Adaptation from Birth to Adulthood* (2005) explores whether childhood aggression arises as a response to early rejection and harsh discipline from parents, or if it is something inherent in the child, leading to an escalation in harshness and rejection from the parents as the aggression increases (Sroufe et al., 2005). Research also indicates that aggression is more likely to occur when one is experiencing rejection from people that one cares about (Downey et al., 2004; Stangor et al., 2014), for example from parents, and this causes frustration. For instance, divorce may be perceived by a child as a form of rejection by their parents. When individuals are frustrated and see suspicious behaviour, they are more likely to perceive it as aggressive, which in turn increases their own tendencies towards aggression. Moreover, some people believe in the value of aggression as a resolution for problems. For example, a child witnessing their parents argue before or after the divorce may be affected emotionally. For them, aggression or violence is an acceptable way of dealing with conflicts (Stangor et al., 2014).

Biological influences on aggression levels

Aggression's evolutionary roots

Examining the evolutionary roots of aggression and the genetic factors behind it might help us understand nature-and-nurture interactions that influence individuals' level of aggression.

Aggression may have evolutionary roots, as humans tend to be aggressive toward others, at least in certain influencing circumstances, for example, danger. This instinct serves to prevent harm in order to save ourselves and our loved ones (Jhangiani & Tarry, 2022). Aggression being a potential survival mechanism implies that if teenagers perceive the divorce as a threat, it might trigger an aggressive response.

Genetic stressors

In 2002, Avshalom Caspi and his colleagues conducted a study that explored the role of specific genetic factors in aggression (Jhangiani & Tarry, 2022). Their research focused on the MAOA gene, which constructs an enzyme, monoamine oxidase A (MAO-A), influencing levels of serotonin, a neurotransmitter that influences our mood, appetite, sleep, and also inhibits aggression. Caspi's findings indicate that individuals with lower MAOA activity, leading to reduced production of serotonin, are at a greater risk of displaying aggressive tendencies in their behaviour. However, in defence of the nature-versus-nurture perspective, which proposes the essential interplay between biological and environmental factors, it was discovered that the genetic factor was only significant for those children who had suffered maltreatment (Jhangiani & Tarry, 2022).

Similarly, parental separation can function as an environmental stressor (Robbers et al., 2012), associated with long-term mental health effects, such as a greater risk for psychological issues, social problems, negative self-image, and low academic achievement (Behrman et al., 1994). Furthermore, aggression is partly heritable, but also influenced by environmental factors, suggesting that children from aggressive families may inherit the genetic proneness, while being exposed to an aggressive environment as well (Klein et al., 2021). Moreover, aggression may serve as a predictor of divorce, proposing that parents having higher levels of aggression may be more likely to experience a marital divorce (Yaser et al., 2010).

Hypothesis

Based on previous research, I hypothesised that aggression could be linked to parental divorce—specifically, I expected to find higher levels of aggression in teenagers whose parents have divorced than in teenagers who come from intact families. Furthermore, I hypothesised that there would be a difference in aggression levels between teenagers whose parents divorced during early childhood and those whose parents divorced more recently. I was also curious about the role of coping mechanisms regarding divorce. Therefore, I examined teenagers from Milestone Institute and my school, Lauder Javne School.

Methods

Procedure

I sent out Google Forms to students of Milestone Institute, and to students at my school (Lauder Javne School), which are both private institutions in Budapest, Hungary. Milestone Institute is a super-curricular institution for advanced studies for students in secondary education, whereas Lauder Javne School is a private high school in Budapest. I also posted a link to the form on my social media profile. The form was approved by the Research Ethics Committee at Milestone Institute, and teenagers under 18 were asked for parental consent before completing it.

My research consisted of an online self-assessment questionnaire that included demographic questions, the Buss and Perry Aggression Questionnaire (BPAQ), and a question about coping mechanisms. My methodology was based on a questionnaire containing three demographic questions, which inquired about the participants' age, their parents' marital status, and timing of the divorce, followed by the 29 items of the BPAQ, and, lastly, participants were asked about potential coping mechanisms that they employed to deal with their parents' divorce (e.g. time, self-help, support from friends or family, or a therapist, and so on).

Participants

My research included teenagers (aged 13–19) mainly from families of a high socioeconomic status with parents of different marital status. The participants' mean age was 17 (16.95), and the standard deviation was 2.86.

Out of all participants (102), 43 teenagers experienced parental divorce, while 59 did not. While the sample was not random but a convenience sample, due to my position as a teenager attending both institutions, it allowed for a deeper understanding of this particular group more than an external researcher might achieve.

Measures

To find out about the aggression levels of the researched teenagers, I used the Buss and Perry Aggression Questionnaire (BPAQ), which measures aggression on four sub-scales: verbal aggression, physical aggression, hostility, and anger. Verbal aggression is a form of behaviour directed to hurt someone through verbal acts, such as shouting or swearing at someone (Allen et al., 2017). An example from the questionnaire is “My friends say that I’m somewhat argumentative”. Physical aggression refers to actions directed to cause harm to someone, with direct physical acts such as hitting someone or something (Allen et al., 2017). For instance, one item states “I have become so mad that I have broken things”. Hostility is an aggressive cognition (Allen et al., 2017). The questionnaire includes this statement as an example, “I am suspicious of overly friendly strangers”. Finally, anger is an emotional response marked by aggression (Allen et al. 2017). For example, “Some of my friends think I am a hothead”.

The BPAQ consists of 29 statements and the respondents are asked to rate their agreement on the 5-degree spectrum of a Likert scale. I calculated an aggression index for each participant by summing up their responses to the 29-item Buss and Perry Aggression Questionnaire, generating a total score ranging from 29 to 145.

Moreover, I asked participants about their possible coping mechanisms (“What/who helped you to overcome divorce?”), and provided options, such as a therapist, friends, extended family, parents, siblings, oneself, time, grandparents, pets, and hobbies. Participants also had the opportunity to describe their own coping mechanisms by selecting “Other”.

Results

By summing up the scores from the Buss and Perry Aggression Questionnaire, I gained a mean aggression score of 76.06 for the respondents. The

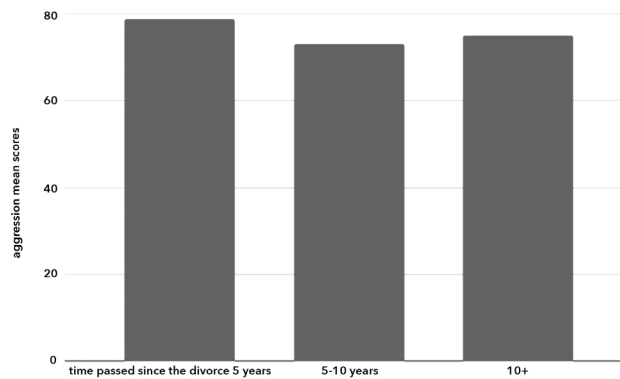
table of Buss and Perry Aggression Questionnaire (BPAQ) scores for participants with parents in different marital status categories:

Table 1 *Aggression scores of teenagers with both intact and divorced parents*

BPAQ score	Intact (n = 59)	Divorced (n=43)
Mean	77.22	74.47
Standard Deviation	15.65	17.81
Minimum	47	39
Maximum	118	119

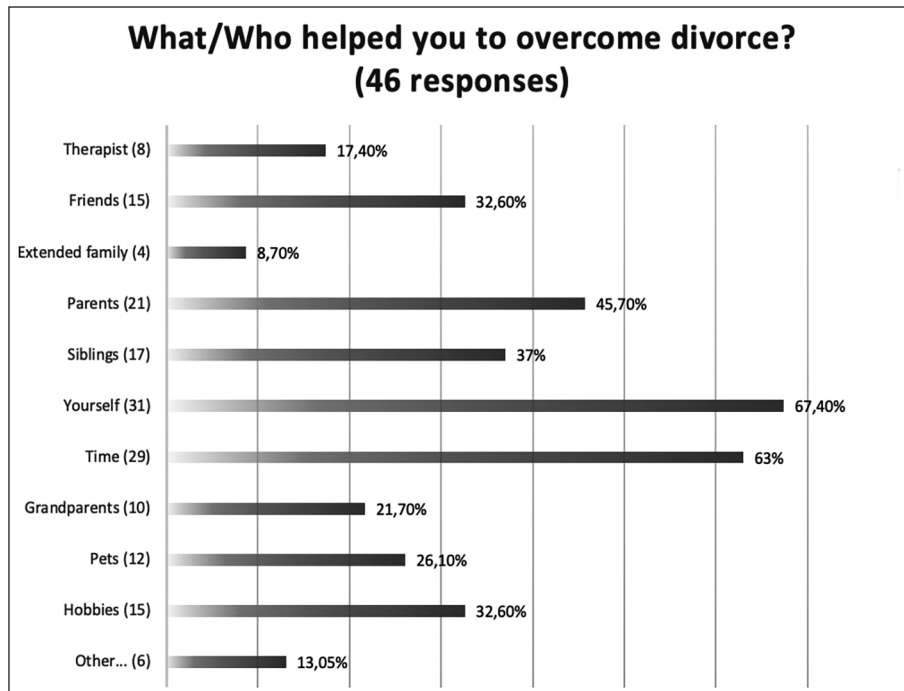
Although the difference is not large, the mean aggression scores of the teenagers with intact parents (77.22) are actually higher than the aggression scores of the teenagers with divorced parents (74.47). Additionally, the minimum score for teenagers with intact families (47) is also higher than it is exhibited for the teenagers with divorced parents (39). The only area where teenagers with divorced parents have a higher score than teenagers from intact families is the maximum score (119), although the difference is still minimal (118). These observations and values are relevant, for the reason that they highlight how parental marital status may be connected to aggression levels, but they also illustrate how other factors beyond family structure might be linked to aggression.

Figure 1 *Mean aggression scores (on the y axis) in relation to the time that has passed since the divorce (on the x axis)*



However, as Figure 1 shows, the mean aggression index was the highest (78.85) for those who experienced divorce in less than five years. As we can see in Figure 1, the second highest mean aggression score (75.33) was noted in individuals who experienced divorce more than ten years ago, suggesting that they went through the divorce as younger children.

Figure 2 Coping mechanisms that helped participants to overcome divorce (in percentage)



Note: Responses for Other... included "I wouldn't say I'm over it", "I didn't really mind", "My mom", "Never had much of a problem", "Nothing 'cause IDC [I don't care]" and "Közömbösen érintett a döntés [I felt neutral about the decision]".

In the questionnaire, I collected possible coping styles from the respondents with the question "What/Who helped you to overcome divorce?" As Figure 2 demonstrates, for the majority of respondents the most successful coping mechanisms included themselves (67.4%) and the time that has passed (63%). Additionally, social support also played a crucial role. At the same time, there was substantial diversity in the coping strategies used, and many respondents reported relying on a combination of strategies to cope.

Discussion

The results of my research do not support my initial hypothesis that teenagers with divorced parents are more aggressive than teenagers from intact families, at least in the examined group. In the population I studied, teenagers from intact families are likely to be even more aggressive than teenagers with divorced parents. In the following section, I will provide four possible explanations for the results I obtained.

It is important to emphasise that differences in the aggression indexes were minor, which could be the outcome of the small number of participants and possible other factors, such as coping mechanisms, differences in the acceptance of divorce, gender differences, or communication styles, which may have helped teenagers to cope with divorce and not to exhibit highly aggressive tendencies. Moreover, it was not examined whether they significantly differed from each other, as the sample size would have made such comparisons unreliable.

Similar experiment in the United States

There was research conducted with students attending elementary school in middle-class Charleston, WV and/or Lanesville, IN (Stapleton, 2009). The students were tested using the Buss and Perry Aggression Questionnaire (Buss & Perry, 1992). Similarly to my findings, the study did not show a correlation between parental divorce and increased aggression levels in teenagers (Stapleton, 2009).

Coping mechanisms

A possible explanation for the outcome of the aggression index could be the various coping mechanisms and coping styles that helped the surveyed teenagers deal with divorce.

Coping mechanisms are defined as thoughts and behaviours prepared to manage external and internal stress (Algorani et al., 2023)—in this situation, a divorce. The term “coping” refers to voluntary and continuous actions in order to reduce or tolerate stress, and coping styles are different types of responses to stress (Algorani et al., 2023), including strategies such as seeking professional help (e.g. from a psychologist), or employing relaxation techniques, with additional support often coming from parents, siblings, friends, and hobbies. Considering the fact that the majority of the

participants in my research were from high socioeconomic status, we can assume that they had more resources for coping than a less privileged teenager would have had. These resources might include financial stability as well as access to professional mental health groups and psychologists.

Gender differences, the role of testosterone

In my questionnaire, I collected demographic data such as age, but did not include a question about gender. This was a limitation regarding my research, as it meant that the possible gender differences could not be shown. Gender difference would count as an important factor, since masculine identity and gender role stress may influence aggression (Cohn et al., 2006). Gender role stress is experienced when individuals feel that they have to obey gender norms, for example, men may feel pressured to behave in an aggressive manner in order to seem more masculine (Cohn et al., 2006). Previous research has shown that men tend to score higher on the physical aggression, verbal aggression, and hostility sub-scales of the BPAQ. Anger was the only scale which showed no sex difference (Buss & Perry, 1992). Moreover, traditional Western masculinity encourages the expression of many forms of aggression, while traditional Western femininity does not (Malonda-Vidal et al., 2021). Traditional masculinity is linked to idealised masculine norms, such as aggression, self-affirmation, social dominance, and a lack of consideration for others (Malonda-Vidal et al., 2021).

Therefore, not collecting data on gender may have dramatically affected the results, since it prevented the potential exploration of gender differences regarding aggression. Furthermore, the research could not focus on gender-specific factors, resulting in missing a source of variation in aggression levels among participants.

Another important factor might come into play regarding men and aggression: testosterone, a hormone which is crucial to elaborate on when researching aggression. Testosterone is the primary male hormone, which is crucial in male growth and acquiring masculine characteristics (LeWine, 2015). A study found that aggressive behaviour is strongly associated with a high testosterone-to-cortisol ratio in the human body (LeWine, 2015). Hence, when combined with genetic factors, such as testosterone or the variation of the MAOA gene, parental divorce might increase the risk of aggression.

It is important to highlight that although testosterone levels are higher in men than in women, the relationship between testosterone and aggression affects women as well. Women, despite having lower overall levels of testosterone, are more sensitive to even small fluctuations in these levels (Jhangiani & Tarry, 2022).

Divorce is often associated with increased experiences of aggression, anxiety, stress, and anger (Behrman et al., 1994), which could consequently be associated with increased testosterone levels. This connection emphasises the essential interplay between hormonal influences and behavioural responses, highlighting the importance of hormones, such as testosterone.

Communication styles

The differences in communication styles and strategies in different families is a crucial factor to mention as well. It is essential to consider the possible differences between communication styles (Liu et al., 2016), since the communication of feelings and the handling of conflicts may affect a teenager's ability to cope with stressful events in their lives, such as divorce. Moreover, it was also suggested that children of highly conflicted parents who stayed together had serious issues as well, for example, they had a hard time forming intimate and loving relationships (Salahian et al., 2021). This could provide another explanation for my research findings that teenagers from intact families have higher aggression scores than teenagers who experienced parental divorce.

Correlation between aggression levels and years passed since the parental divorce

In my research, participants who experienced divorce at a young age had higher aggression scores than those who went through divorce at an older age. This score could be explained by the fact that younger children are less equipped to cope effectively with divorce (Lansford et al., 2009).

However, the highest aggression scores belonged to those participants who experienced divorce in the last five years, proving one of my hypotheses right. This finding aligns with Lansford's argument that teenagers need time to adjust after the occurrence of divorce (Lansford et al., 2009). These participants may have experienced divorce during their teenage years, aligning with the suggestion that divorce occurring during adolescence

may affect areas of development mentioned earlier. The heightened aggression scores might be linked to the challenges that the teenagers had to face, forming their identity while coping with divorce.

Suggestion for future research

In addition to the limitations regarding gender that I have mentioned above, future research could test whether the differences that I found are statistically significant between the groups, using larger cohorts.

Conclusion

Previous research has suggested that divorce can have a significant impact on teenagers and children with regard to emotional and behavioural problems, such as aggression. Aggression is a complex behaviour that is influenced by the interplay of biological and environmental factors. It is evolutionary, serving as a defence mechanism, and it is influenced by our brain and our hormones.

The relationship between aggression and divorce shows the complex interplay between nature and nurture. While many reveal aggression as a response to family disruptions, such as divorce, others may show a previous tendency for aggression which is aggravated due to the divorce.

In conclusion, this review does not support my hypothesis that claims that parental divorce can increase teenage aggression. Further research should take into account a more complex set of predictors, such as gender, socioeconomic status, and settlement type.

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LEÓ GULYÁS-GORKA

Introduction to Gender Differences in Complementary and Alternative Medicine Usage in Hungary: Patterns, Motivations, and Consultation Times

Introduction

In the past couple of decades, a new wave of alternative medicine has been observed to sweep through Europe. Recent research shows a clear upward trend in complementary and alternative medicine (CAM) usage. In Denmark, CAM use rose from 10% in 1987 to 24% by 2021 (Möller, Ekholm & Christensen, 2024), while in the broader Nordic region, usage among adults increased from 31.8% in 2006 to 40.2% in 2015 (Gunnarsdottir, Örlygsdóttir & Vilhjálmsdóttir, 2019). These findings suggest a steady rise in CAM's popularity over the past decades, though it is important to note that definitions of CAM have varied widely across studies.

This definitional challenge is particularly relevant in Hungary. Research by Polereczki et al. (2019) highlights that if CAM were to broadly include all common herbal teas, it would account for a significantly higher use of CAM. Given that these are the most popular form of alternative treatment in Hungary, using such a broad definition would likely yield a near-universal usage rate, obscuring the more specific trends this study seeks to analyse. To ensure the study retains its relevancy, this research follows the structured classification provided by Kemppainen et al. (2017), where CAM is categorised into four main modalities: Traditional Asian Medical Systems

(e.g., acupuncture, traditional Chinese medicine), Alternative Medicinal Systems (e.g., homeopathy, herbal treatments), Manual Body-Based Therapies (e.g., chiropractic, osteopathy, reflexology), and Mind-Body Therapies (e.g., hypnotherapy, spiritual healing, reiki).

Potential reasons for increasing CAM Usage

In Hungary, as in other parts of Central and Eastern Europe, CAM has seen increasing use in recent years. The Hungarian healthcare system places a strong emphasis on conventional medicine, yet the public's growing interest in alternative therapies reflects a broader European trend (Expat Focus, 2023).

Previous research suggests that one of the main appeals of CAM is the extended consultation time provided by practitioners, often perceived as a more personalised form of care. Studies by Gunnarsdottir, Örlygsdóttir, and Vilhjálmsson (2019) emphasise that CAM practitioners often adopt a holistic approach, dedicating more time to understanding their patients' needs compared to GPs. Multiple findings have been published about alarmingly short consultation times for GP appointments, which might also be an indicator as to why many could turn to generally private alternatives, such as alternative medicine (Campbell, 2019; Irving et al., 2017).

A study in six European nations found that many Western European countries, such as Spain, Germany, and the UK, have on average GP consultation times lasting less than 10 minutes (Deveugele, 2002). Other studies have also looked at the same issue on a worldwide basis and have found that in Hungary, consultation times fall between those of Uganda and Serbia, the former taking the edge with a few seconds, averaging at just 6 minutes per consultation (Irving et al., 2017).

In contrast, alternative medicine consultations have been reported to be significantly longer and more thorough, with patients experiencing a stronger, more in-depth connection with their practitioner. For instance, Frank (2002) found that first-time homeopathic consultations last between 60 to 180 minutes.

Gender Differences in CAM Usage

CAM usage has gained traction due to its increasing prevalence and, interestingly, gender disparities have been observed in its adoption. The pre-

vailing view is that women are more likely to engage in complementary and alternative medicine practices than men (Kemppainen et al., 2018). From these observations, it could be inferred that women are leading this movement towards CAM in Hungary, as seen across Europe (Abdalla et al., 2020).

In Switzerland, Klein, Frei-Erb, and Wolf (2012) reported that 30% of women used CAM in the preceding twelve months, compared to only 15% of men, the most popular therapies being homeopathy, osteopathy, acupuncture, and shiatsu/foot reflexology. Similarly, in Hungary, a survey by a Hungarian market research agency, Medián noted that 25% of women had homeopathic products recommended to them, versus 19% of men (Mezei, 2017). A study from Tromsø, Norway, by Kristoffersen et al. (2014) found that 42% of women reported using CAM in the last twelve months compared to 24% of men. The study suggests that women, possibly due to unmet healthcare needs in public systems, turn to CAM as an alternative or complementary approach.

Factors Influencing Higher CAM Usage Among Women

Women's greater engagement with CAM could be explained by their higher usage of conventional medicine. Data from Australia shows that women visit their GPs more frequently than men, averaging seven visits per year compared to five for men (Australian Bureau of Statistics, 2021). Furthermore, TriCity Medical Center in the United States found that up to 40% of men do not seek medical assistance until an issue becomes serious, possibly due to concerns about societal expectations (Tri-City Medical Center, 2017).

Indeed, current evidence suggests that women generally tend to be more proactive in seeking healthcare services, including, but not limited to alternative therapies. According to multiple studies, women tend to visit all types of healthcare professionals on a more frequent basis than men tend to, regardless of education level (Bertakis et al., 2000). One reason for this could be that the overwhelming majority of women experience pain and discomfort on a monthly or even more frequent basis from period-related pain, while men have no such recurring, biologically inherent pain or discomfort. In addition, assuming the global average of world fertility rates, there are currently 2.3 births for every woman, which is around 20–21

months of pregnancy, pregnancy-related pain and childbirth that men also never experience, thus supporting the assumption that men may report or seek treatment for health concerns less frequently, possibly contributing to lower medicine (including alternative medicine) usage (World Bank, 2022). Indeed, Flocke and Gilchrist (2005) found that female patients were more up-to-date on counselling services and immunisations compared to male patients.

One further factor that may contribute to why women tend to use CAM more frequently than men is the nature of doctor-patient relationships in conventional medicine. Despite women's more frequent engagement with conventional healthcare services, conventional medicine has historically overlooked or downplayed women's symptoms—a trend that may contribute to feelings of dismissal or dissatisfaction. This perceived gap in care may push women to seek more holistic and time-intensive consultations, such as those offered by CAM practitioners, where they may feel more heard and taken seriously (Shahvisi, 2018).

Aim of the study

The aims of this research are threefold. It aims to explore whether the recent European trend that women tend to use Complementary and Alternative Medicine (CAM) more frequently than men is also evident in Hungary (H3).

Furthermore, the study investigates a potential causal explanation for this gender disparity, focusing on patient experiences within the conventional healthcare system. More specifically, it examines whether differences in consultation times and access to general care may contribute to women's greater use of CAM. Other possible explanations, such as individual attitudes toward CAM, levels of education and location of the participant, while collected, are excluded from the scope of this paper to maintain analytical, gender-relevant focus.

If GPs spend less time with patients than CAM practitioners (H1), and if women in particular experience shorter consultations with GPs (H2), this may partly explain why women are more likely to seek out alternative forms of care (H3).

This question is of particular interest because Hungary, like many other Central and Eastern European countries, faces increasing strain on its

public healthcare system, where consultation times are short and access to general practitioners is often limited. Understanding whether these structural inequalities contribute to gendered differences in CAM usage can provide valuable insight into how women navigate gaps in conventional healthcare.

Through a structured questionnaire targeting Hungarian participants aged 16 and above, we seek to uncover the motivations and patterns behind CAM usage and its gender-specific nuances.

Hypotheses

These three hypotheses below together aim to explore differences and trends between gender, consultation time, and the growing appeal of CAM.

H1: GPs spend less time with patients than alternative medicine practitioners.

H2: GPs spend less time with women than with men.

H3: Women use CAM more frequently than men.

Methods

Participants

The study targeted participants aged 16 and above, requiring parental or legal guardian consent for those between 16 and 18 years old. The goal was to include men, women, and non-binary participants to explore gender differences in the usage of Complementary and Alternative Medicine (CAM) in Hungary. To participate, individuals had to be at least 16 years old, possess a high-level understanding of the Hungarian language, and provide consent to participate.

A total of 212 responses were collected, with 135 women, 76 men, and 1 non-binary participant. The participants' ages ranged from 16 to 78 ($M_{age} = 29.63$, $SD_{age} = 12.56$). The highest levels of education among the participants were distributed as follows: 15.09% had completed middle school, 33.49% had completed high school, 6.13% had obtained a degree from college, 17.45% held a Bachelor's degree, 23.58% had a Master's degree, and 4.25% had earned a PhD.

Materials

A structured questionnaire was developed to gather quantitative data on doctor-patient relationships, CAM usage, gender-specific health concerns, and motivations for CAM usage among participants above 16 years of age. The questionnaire was administered through Google Forms, and it included both closed-ended and scaled questions to facilitate quantitative analysis. Participants were asked about their age, gender (male/female/non-binary), level of education (middle school/high school/college/BA, MA/PhD).

Table 1 Structure of the Questionnaire Exploring CAM Usage and Health Behaviour by Gender in Hungary

Section	Sample Questions / Indicators
Doctor–Patient Relations	- Comfort level in discussing health concerns with GPs - Trust in the doctor’s advice (1–10 scale)
CAM Usage	- Experience with CAM - Types of CAM therapies tried (multiple-choice) - Differences in approach between CAM and GPs
Gender-Specific Health Concerns	- Presence of gender-specific health issues (yes/no) - Nature of these concerns (short text entry)
General Health Behaviour	- Frequency of doctor visits (e.g., weekly to less than once a year) - Openness to CAM (1–10 scale)

Note: CAM = Complementary and Alternative Medicine; GP = General Practitioner.

Procedure and data collection

The study was conducted following ethical guidelines, ensuring that all participants provided informed consent before participating. The study received approval from the Research Ethics Committee at Milestone Institute, dated 12/01/2024.

For minors, consent was obtained from parents or legal guardians via the ticking of a box before beginning the completion of the form. Participants

were recruited through a combination of online and offline methods to ensure a diverse sample. The online channels included Reddit, Instagram, Facebook, Messenger, and email, while offline methods involved conversations and QR codes physically distributed at academic institutions such as Lauder Javne School, Milestone Institute, and Mozgásjavító Általános Iskola.

Participants were asked to complete the questionnaire at their convenience, ensuring anonymity and confidentiality of their responses. The duration of completion for the questionnaire averaged at about 7–10 minutes per participant. Data collection spanned over a roughly two-month period to allow enough time for participation. Data was not collected on participants' demographic characteristics such as place of residence (urban vs. rural). However, given that data collection was primarily conducted online via social-media platforms, it is likely that the sample overrepresents city-based respondents.

Data Analysis

Quantitative data from the questionnaires was analysed using Google Sheets. Descriptive statistics were used to summarise the demographic characteristics of the participants and their responses, as well as to explore the relationships between trust in doctors, frequency of doctor visits, and openness to CAM.

Results

Table 2 *Participant Responses Regarding Visits to Alternative Doctors by Gender*

Response	Men (n = 76)	Women (n = 135)
Yes	11 (14.47%)	30 (22.22%)
No	65 (85.53%)	105 (77.78%)

Note: Percentages indicate the proportion of each gender group who responded “yes” or “no” to visiting an alternative doctor.

Table 3 *Frequency of Alternative Doctor Visits by Gender*

Frequency of Visit	Men (n = 76)	Women (n = 135)
Annually	8 (10.53%)	22 (16.27%)
Semiannually	3 (3.95%)	5 (3.70%)
Every 2–3 months	0 (0.00%)	2 (1.48%)
Monthly	0 (0.00%)	1 (0.74%)
No visit	65 (85.53%)	102 (75.56%)

Note: Percentages reflect the proportion of each gender group reporting each visit frequency to alternative doctors.

We found that of the total 212 respondents, 19.34% answered that they had already visited an alternative practitioner, as demonstrated in Table 2. Separated into gender, we can see that 22.22% of women but only 14.47% of men have already been to an alternative doctor/naturopath. This 7.75% difference may suggest that women are more likely than men to seek alternative medical care, aligning with previous findings that emphasise women's greater engagement with holistic and complementary healthcare. Findings on the frequency of visits to alternative practitioners (Table 3) also support this claim, as data presents 6.67% of female respondents visit their alternative doctor every 2–3 months, while 3.3% visit them on a monthly basis. No men reported such frequent visits.

Table 4 *Time Spent with GP by Gender*

Duration of Visit	Men (n = 76)	Women (n = 135)
Less than 10 minutes	28 (36.84%)	55 (40.74%)
Between 10–30 minutes	44 (57.90%)	76 (56.30%)
More than 30 minutes	4 (5.26%)	4 (2.96%)

Note: Participants reported the typical duration of a general practitioner (GP) visit.

The data listed in Table 4 demonstrates that the vast majority of GP consultations are short. Across both genders, over 95% of consultations lasted 30 minutes or less, with a significant proportion falling below 10 minutes (36.84% for men and 40.74% for women).

It is difficult to assess the exact length of such consultations for our study as participants were only asked to categorise their experience in one of three brackets, and important factors, such as doctor workload, patient age, and severity of problem were not taken into account. Nevertheless, a trend is still interpretable from the data we collected.

Table 5 *Time Spent with Alternative Doctor by Gender*

Duration of Visit	Men (n = 76)	Women (n = 135)
Never visited	65 (85.53%)	105 (77.79%)
Less than 10 minutes	2 (2.63%)	0 (0.00%)
Between 10–30 minutes	4 (5.26%)	11 (8.15%)
More than 30 minutes	5 (6.58%)	19 (14.07%)

Note: Responses indicate how much time participants typically spend during a visit with an alternative medicine practitioner.

In contrast, alternative medicine consultations tend to have lasted longer, based on the answers we have received (see Table 5). For both genders, the vast majority of participants who answered having already visited an alternative practitioner told us that the consultation lasted more than 30 minutes, 45.45% for men and 63.33% for women. The second largest group, 36.36% of men and 36.66% of women, indicated that a consultation with their alternative doctor lasted between 10 and 30 minutes, a figure still surpassing the average length of most GP consultations (see Table 4). The option indicating that the participants' alternative doctor spends less than 10 minutes per consultation was the least selected, with 2.63% of men and none of the women choosing it.

Discussion

H1: GPs spend less time with patients than alternative medicine practitioners

Our data on consultation times with general practitioners (GPs) aligns with trends observed across Europe. The vast majority of GP consultations for both genders (94.74% for men and 97.04% for women) lasted 30 minutes or less, with a significant proportion falling below 10 minutes (36.84% for men and 40.74% for women). As the current consensus states, medical examinations and consultations should last for at least 25 minutes, if

not more, to provide sufficient time for doctors to give accurate diagnoses (Borekci et al., 2017). Unfortunately, this mark is seldom met in our fast-paced world.

For respondents who have also answered our questions regarding their experience with alternative practitioners, the findings are much less alarming. For both genders, around half of the participants who answered having already been to an alternative practitioner told us that the consultation lasted more than 30 minutes, 45.45% for men and 63.33% for women. The second largest group, 36.36% of men and 36.66% of women, indicated that a consultation with their alternative practitioner lasted between 10 and 30 minutes, a figure still surpassing the average length of most GP consultations. The option indicating that the participants' alternative doctor spends less than 10 minutes per consultation was the least selected, with 2.63% of men and none of the women choosing it. These findings support our hypothesis (H1) that GPs spend less time with patients than alternative medicine practitioners. They also align with previous research, such as the study by Irving et al. (2017), which found that GP consultation times in Hungary average around six minutes.

Even with these rather startling numbers, our current sample of the Hungarian population is not even significantly out-of-line when compared to wealthier countries such as Germany, Spain, and Britain, studies show that some of the shortest consultation times are observed, averaging around 7.6, 7.8, and 9.4 minutes per consultation, respectively. (Campbell, 2019; Deveugele, 2002).

People are feeling rushed in and out of the doctor's office during conventional medicine consultations. For instance, in Hungary, a study in the city of Szeged found that penicillin combinations are frequently prescribed for conditions where antibiotic therapy is not required, such as viral respiratory infections. This makes Hungary one of the worst-performing countries in unnecessary antibiotics prescriptions in the European Union. Many are understandably dissatisfied with the six-minute doctor consultation that usually ends with some form of penicillin being prescribed, in some cases completely unnecessarily (Matuz & Soós, 2010).

Understandably, people turn to something "outside of science" if they are dissatisfied with conventional, scientific medicine. The longer consultations typical of CAM practitioners may offer a sense of validation and understanding that is often absent in mainstream medicine. Rather than

viewing this as a simple rejection of science, it may reflect a deeper desire for holistic, empathetic, and patient-centred care—something conventional systems are currently struggling to provide.

Future research could explore the motivations behind CAM use, particularly the emotional and psychological benefits of longer consultations, especially focusing on potentially changing trends since COVID-19. It would also be valuable to assess whether longer consultation times with CAM practitioners translate to better health outcomes and patient satisfaction compared to shorter GP visits. Finally, studies could explore how healthcare systems might incorporate positive aspects of CAM, such as extended consultations and holistic care, to improve the doctor-patient relationship in conventional medicine.

H2: GPs spend less time with women than with men

Interestingly, our data shows a slight gender difference in GP consultation times, supporting our hypothesis (H2) that GPs spend less time with women than with men, though the difference is not substantial. Women appear to be marginally overrepresented in the shorter consultation time categories, with 40.74% reporting consultations lasting less than 10 minutes, compared to 36.84% of men. Conversely, 5.26% of men reported consultations lasting more than 30 minutes, while only 2.96% of women experienced such extended consultations. More research would be needed to confirm this trend.

If the realm of conventional medicine does indeed provide care with higher satisfaction rates for men, then one might deduce that gender bias, or even structural sexism, could be at play within the healthcare system. These are strong claims, however, the subtle but consistent trend of shorter consultation times for women could suggest that healthcare providers may unconsciously allocate less time and attention to female patients, possibly due to stereotypes or assumptions about women's health concerns. This might reflect a broader issue of gendered disparities in healthcare, where women's health issues, especially those related to pain, menstruation, or mental health, are often undervalued or dismissed as less urgent. It is important to note that these findings should be approached with caution, as more extensive research would be needed to explore whether this trend is a result of healthcare providers' biases, institutional factors, or differences

in how men and women approach healthcare, or perhaps a complex combination of all of the above.

H3: Women use CAM more frequently than men

According to current science, there is little to no biological evidence that could account for such a significant difference in CAM usage between men and women, especially those with more advanced education. It is also pertinent to note that this trend is observable and true in the greater part of our global population. In most countries, regardless of geographical location, where complementary and alternative medicine and therapies are becoming more popular by the year, women tend to use it much more frequently than men.

The study's findings suggest an alignment between our population sample and broader European trends regarding gender differences in the use of CAM. The data shows that 22.22% of women in our study have visited an alternative practitioner, compared to only 14.47% of men—a 7.75% difference that supports our hypothesis (H3) suggesting that women use CAM more frequently than men.

Likewise, Klein, Frei-Erb, and Wolf (2012) reported that in Switzerland, 30% of women used CAM in the preceding 12 months, compared to only 15% of men. Similarly, a study in Norway by Kristoffersen et al. (2014) found that 42% of women reported using CAM in the last 12 months compared to 24% of men. Outside Europe, similar patterns emerge. In the United States, an analysis of 88,962 adults showed that women were three times more likely to use CAM than men, particularly for chronic conditions like arthritis and pain management (Zhang et al., 2015). The situation is also apparent in the Middle East, where a Saudi Arabian study concluded that women predominated in CAM use (51.5% vs. 44.3% for men), driven by scientific evidence-seeking behaviour, while men favoured cultural traditions (Abdalla et al., 2020).

Explaining the stark gender difference in CAM usage is not only extremely important but is also intriguing, as it may uncover potential differences in global healthcare dissatisfaction, especially among women. The exact reasons why a significant percentage of people tend to turn in the direction of alternative medicine were not examined during this study. However, this research provides stable grounds for future investigations

aiming to account for the differences between men's and women's use of complementary and alternative medicine. Future research could explore the underlying motivations and perceptions that drive CAM usage, such as dissatisfaction with conventional medicine, openness to holistic approaches, or the influence of cultural and familial attitudes toward health. Additionally, examining how perceptions of legitimacy and trust in CAM vary by gender could offer insight into usage patterns. Another promising direction would be to investigate how educational background intersects with CAM usage—particularly whether higher education levels affect men and women differently in their approach to alternative therapies.

Limitations

This study is subject to several limitations that should be acknowledged. First, the sample is not representative of the general population, as it was composed of voluntary respondents, from school(s), acquaintances, flyers, and posts—potentially introducing self-selection bias. Additionally, there was a significant gender imbalance in the sample, with women making up nearly twice the number of male participants. This disproportion may affect the generalisability of gender-based comparisons. Lastly, the number of participants who reported using Complementary and Alternative Medicine (CAM) was relatively small, which limits the statistical power and reliability of comparisons between CAM users and non-users.

Moreover, although data were collected on educational attainment and participants' attitudes toward CAM, these variables were not analysed in depth in this paper as the goal of this study was to explore gender differences in CAM usage. However, this could be further explored in the future.

Conclusion

This study aimed to uncover the current complementary and alternative medicine usage among Hungarian citizens aged 16 and above. The findings align with broader European and global trends, showing that women tend to visit both primary care general practitioners (GPs) and alternative therapists more frequently than men. Consultation times across the entire examined population for general practitioners are alarmingly short, while consultations with alternative practitioners are relatively long. This

study provides valuable insights into gender disparities in complementary and alternative medicine (CAM) usage within Hungary, contributing to a growing body of literature on this topic across Europe.

Future studies should explore the motivations behind CAM usage in greater depth, particularly focusing on cultural influences, perceptions of legitimacy, and trust in alternative therapies. It would be especially useful to observe trends of CAM usage pre- and post-COVID in Hungary and internationally, as to this date, no comprehensive studies have been published on this topic. Future research should also include the “doctors’ perspective” by conducting interviews and questionnaires with doctors and their patients to provide a more nuanced final picture.

Future studies could also consider the role of private healthcare services in Hungary and examine how differences in waiting times and perceived quality influence decisions to seek CAM. In the present study, the terms “conventional” or “traditional” healthcare may refer to both public and private providers; however, the distinction between the two can be substantial and may significantly affect healthcare choices.

Conflict of Interests

The author declares that there is no conflict of interest regarding the publication of this paper.

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How Did Our Grandparents Listen to (Western) Pop Music on the Radio in the 1960s and early 1970s in Hungary and How Did it Affect Them?

Introduction

It is hard to imagine a time when music was not just a few clicks away. Today, we have millions of songs at our disposal: streaming platforms like YouTube or Spotify, playlists, instant recommendations. However, for many who lived during the Cold War era, music was more than simply some sort of entertainment. It served as a connection to the world outside. Just recently, I had an intriguing conversation with my grandfather, who still listens to music on the radio. To him, the radio is everything—his connection to music, news, and the world. I was fascinated by how much he relied on it, especially since it is something I barely use nowadays. It made me wonder: How did people like my grandfather back in his youth experience music? At the time in Hungary, under a communist regime, it was not as simple as turning on the radio and listening to any music of their choice. Western music, which was considered a form of rebellion, was almost impossible to access, but somehow, people still found ways to listen to it. How did listening to The Rolling Stones or The Beatles, for instance, on a restricted radio broadcast affect the lives of young people in Hungary? In order to comprehend how this music influenced the views of Hungarian

adolescents under a restrictive political system, in this article I will examine 31 letters written in May 1971 to the *Teenager Party* and *Délutáni Randevú*, programmes broadcasted by Radio Free Europe, to find answers for the questions about who listened to these programmes, what background they had, and to make conclusions on how it affected them.

One of the most significant sources of Western music between 1959 and the late 1960s was Radio Free Europe (RFE), a US-funded station broadcasting from Munich, Germany. Radio Free Europe's network offered listeners music, news, and cultural material, as well. *Teenager Party*, broadcasting from 1959 May, hosted by László Cseke (Géza Ekecs's pen name), provided Hungarians access to a global pop culture. This show featured the latest hits from Western bands such as The Rolling Stones, The Beatles, and The Animals, etc. The impact of *Teenager Party* was especially significant during the 1960s, when rock and roll and beat music were initially banned, and later only tolerated by Hungarian authorities. At the time, RFE and Radio Luxemburg were not the only ones which were providing Western music, Voice of America and even local radio stations also did. There were also similar radio programmes to *Teenager Party* in neighbouring countries, such as *Metronom* in Romania—which Adrian Matus discusses further in his thesis (2022). The host's name was Cornel Chiriac, in an analogous role to László Cseke. The popularity of *Teenager Party*—and its successor, *Délutáni Randevú* (“afternoon rendez-vous”)—remained strong even after Hungarian public radio began airing more popular music programmes aimed at young people. Cseke worked at the station in Munich until Radio Free Europe ceased operations in 1992, and he passed away there in 2017.

However, it was not easy to listen to foreign broadcasts first in the 1950s. Ordinary radio sets, particularly the standard *néprádió* (“people's radio”), were not always able to receive these frequencies clearly or at all since the Hungarian government frequently blocked international radio transmissions in order to reduce their impact. The broadcasts of RFE were no longer jammed after 1964 by Hungary, so the difficulties of listening were not definitely due to it, but mostly to variable shortwave transmission. From the late 1960s onwards, modern portable transistor radios appeared and quickly became popular with young people. Although it is no secret that the very reason this “prohibited” music was played on a radio show in Munich in the first place was to make the West more appealing to the young

during the Cold War—and the show was quite a successful one. Johnson (2010) contends that in addition to operating as broadcasting organisations, Radio Free Europe and Radio Liberty were also tools of American public diplomacy that were funded by the CIA to—eventually—stop the spreading of communist ideologies and to introduce Western values into everyday life in the East. After an extensive audit of the radio, RFE was no longer financed by the CIA after 1971, but by the American Congress, so it would be a mistake to associate RFE with merely a “security” agenda. Radio Free Europe’s musical editors were similar in their anti-establishment’s ideas and conducts, not just voices of Western counter-propaganda. Rather than offering an anti-communist outlet, RFE first offered a platform of uncensored news and music to Hungarians. In order to listen to these stations, some Hungarian listeners in the early 1960s adjusted their radios to be able to pick up Western frequencies, too. Others, particularly those from affluent backgrounds or with international connections, smuggled radios, usually West German-made models with better reception capabilities.

During my interview with my grandfather, he reminisced that even in his modest village of Tarcál there existed a couple of affluent teens who were able to tune into *Teenager Party* on Radio Free Europe. The popularity of beat music quickly grew across the nation, not just in big cities, but some privileged young people also listened to it in small villages around the country. Students who were able to pick up the broadcasts shared what they had heard with their close friends and discussed the different songs and bands. However, it is important to note that they could not understand the lyrics or even correctly pronounce or spell the names of songs or bands. My grandfather pointed out that the music was the main focus of these shows and that they did not spark political discussions among them. Few of his peers in Szerencs talked about the tunes on a daily basis, usually just to make them seem “more cool”. *Teenager Party* was more about being noticed than it was about making a statement.

In the view of my grandfather, the listeners in his class (4 boys and 4 girls out of 32) only listened to these radio programmes to stand out of the crowd by knowing all the new Western hits. None of them—according to my grandfather’s recollections—sent letters to the show directly, they simply enjoyed listening to it whenever they had the opportunity. Which made me wonder, even if listening to these programs was so hard, how could one possibly have sent letters? What did these letters reveal about their experiences and desires?

Sources, Literature and Methodology

I examined both primary and secondary sources to analyse the ways in which Western music affected Hungarian adolescents during the Cold War. The primary sources include 31 listener letters to radio programs like *Teenager Party* and *Délutáni Randevú*. By examining their language, recurring themes, and specific song requests, one can better understand the extent to which Western music shaped their worldview.

Additionally, I conducted an interview with my grandfather, who, growing up in the village of Tarcál, experienced firsthand the challenges of listening to Radio Free Europe in a largely isolated environment. Furthermore, I looked at archive interviews with people who worked on or listened to these radio shows for more context, such as Géza Ekecs. These interviews shed light on the reasons behind song selections, the effects of governmental censorship, and the technical difficulties associated with tuning into prohibited broadcasts. The secondary sources I used were academic articles, while historical analyses of media power and Cold War propaganda were mostly the result of recommendations and further research. During the Cold War, music and radio were not only sources of amusement but also of subtly expressed opposition and cultural negotiation (Crooker, 2019). To properly analyse all the data, I use a combination of textual analysis and historical interpretation, including diagrams and hermeneutic methods. How did young listeners overcome the restrictions placed by the government, and how much did Western radio programs influence the Hungarian youth in the 1960s–1970s?

Regarding the letters, every one of them has the same format they usually follow: they start with a greeting to the radio host, then move on to a personal introduction, song requests, and, occasionally, a brief explanation of the song's significance (see Appendix Item 2). Sometimes, in *Teenager Party* for instance, they included a short story of a recent personal experience or the reason for requesting a song (Koltai & Ekecs, 1996). Many of these letters also include misspelled song titles or other words, or phonetic approximations of English words. I can infer information about the letter writers' overall language skills so as to draw conclusions about how teenagers or writers at the time interpreted Western beat music. Secondly, I will analyse the authors of the letters—their age, gender, and use of pseudonyms—using charts to present them. The third part of this paper examines

the most requested bands and songs, showing what kind of music was popular, their value system, and why they mattered to young people.

Analysis

The language barrier

In the 1970s, English was rarely spoken in Hungary. In 1981 only 1.1% of the Hungarian population spoke any English (Dörnyei, 1993). In the western regions, German was more common among the more affluent population, due to historical ties and cross-border connections, while the middle class in Hungary often had some knowledge of German or, in rarer cases, French. However, English was almost never taught in schools, meaning most teenagers had no formal education in the language, merely in Russian. Despite this, English-language Western music was extremely popular, and young listeners tried to engage with it however they could. This led to creative attempts at understanding and remembering song titles, which resulted in frequent misspellings, phonetic approximations, and even complete rephrasings. For instance, many Hungarian fans would write their requests using Hungarian phonetics. Others attempted literal translations, sometimes changing the meaning of the words in the song titles. The letters sent to radio shows reveal these language struggles clearly, because listeners often mixed English with German or Hungarian words to describe the songs they loved. This difficulty in understanding English also influenced how Hungarian teenagers related to Western music. They often did not know the lyrics, so they only hummed the melodies, nevertheless they were impacted by the emotions in the voices and the often rebellious energy of the music. For many, simply knowing a song's title, even in a distorted form, was a way to connect with a world beyond their own. People frequently react to the emotional tone of music, even if they do not comprehend the lyrics, according to a study that looked at the emotional influence of music on listeners (Juslin & Västfjäll, 2008). This implies that the music's emotional content can serve as a bridge that goes beyond linguistic barriers.

One thing that immediately stood out for me while going through the letters—beside the fact that 23 out of the 31 letters contained grammatical or punctuation mistakes—was that some song titles were written partly in Hungarian and partly in English. I came to the conclusion that among

many, the following three were the main reasons why song titles were translated on the radio in the 1970s.

The first one is quite logical: most people did not speak English. By translating the titles, radio hosts made it easier for the general public to understand what the songs were actually about. Translating them into Hungarian helped make the songs feel more familiar and accessible.

Another reason was the political and cultural climate of the time. While Western music did reach Hungarian listeners, its presence was carefully controlled by the government, which was strict about language use and media content. When it did reach Hungarians, it was particularly through state-run media and activities such as *Táncdalfesztivál* (a national popular song contest) or youth clubs. These were in fact carefully chosen and presented to avoid overtly political messages or a way of life that went against socialist standards. While certain jazz and pop performers were permitted to play, their songs were usually edited or changed to conform to state ideology, and their repertory was usually checked. On the other hand, RFE's broadcasts usually contained a wide range of Western pop culture, from The Beatles' and The Rolling Stones' newest rock-and-roll singles to jazz and other music that went against or outside the tight ideological rules set by the Hungarian government. Translating song titles into Hungarian may have made the music seem less foreign and, in some cases, less of a threat. Even though *Teenager Party* was not part of the state-run media, adapting song titles to Hungarian could have been a way to make the listeners feel more at home.

Finally, translating titles helped listeners connect more easily with the music. Those who struggled to understand the English lyrics could at least remember the Hungarian version of the title, making it easier to discuss the songs among friends. In some cases, the Hungarian translations became more well-known than the original English titles, because the people preferred to use the Hungarian version, which they knew how to pronounce.

The content of the letters

Western music in general, and the *Teenager Party* and *Délutáni Randevő* radio shows in particular were popular not only among teenagers but also among adults. The letters demonstrate that sometimes parents and older listeners were also engaged, requesting songs and expressing their opin-

ion about Western musicians and beat music. Alongside *Teenager Party*, *Délutáni Randevú* also had a significant audience engagement. While *Teenager Party* focused heavily on Western pop and beat music, *Délutáni Randevú* was perfect for a slightly older audience, playing a more diverse mix of banned Hungarian and popular international songs (Koltai & Ekecs, 1996). Listeners had to send their letters well in advance to request a song. For instance, Cseke, the host of *Teenager Party*, had a system where requests had to be submitted at least two months ahead of time (Koltai & Ekecs, 1996). A crucial factor in the show's popularity was the opportunity it provided for recording songs from the radio. Since official releases were heavily regulated and foreign albums were difficult to obtain, listeners found creative ways to preserve their favourite tracks. They frequently requested specific songs under pseudonyms and timed their requests exactly (4 p.m. or 6 p.m.) to ensure uninterrupted recordings.

Among the 31 letters, seven came from individuals requesting songs for their upcoming birthdays, often sharing personal anecdotes about why a particular song held special meaning for them. Cseke usually asked for these stories in exchange for playing the requested songs, some of which he would then read out on the air. Many of these messages were deeply personal, usually a love story or a loving memory of a holiday. Twelve of the letters opened with subtle complaints about the inefficiency of the Hungarian postal service, mentioning that this was their second or even third attempt at getting a request through. Interestingly, while only four of the 31 letters originated from Hungary itself, others came from a variety of locations, with one surprising letter arriving even from Tel Aviv, Israel. However, Yugoslavia appeared to be the most reliable postal route for Hungarian listeners, with eight letters coming from there.

One particularly memorable letter was marked with the pseudonym/motto: "Szeretném az Önök országát meglátogatni" ("I would like to visit your country"). Rather than requesting a song, the sender—a little boy writing on behalf of a man in need of medical treatment—asked for assistance, as the man needed eye surgery that could only be performed by foreign doctors. The letter's handwriting was barely legible, and full of bad punctuation. Unlike most other writers, this individual from Cegléd included his full address, possibly hoping for a direct reply.

Figure 1 *Places the letters came from*

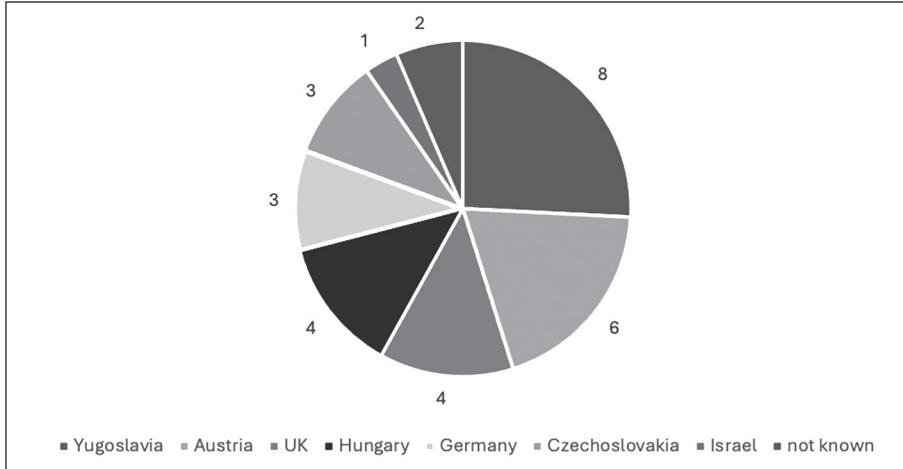
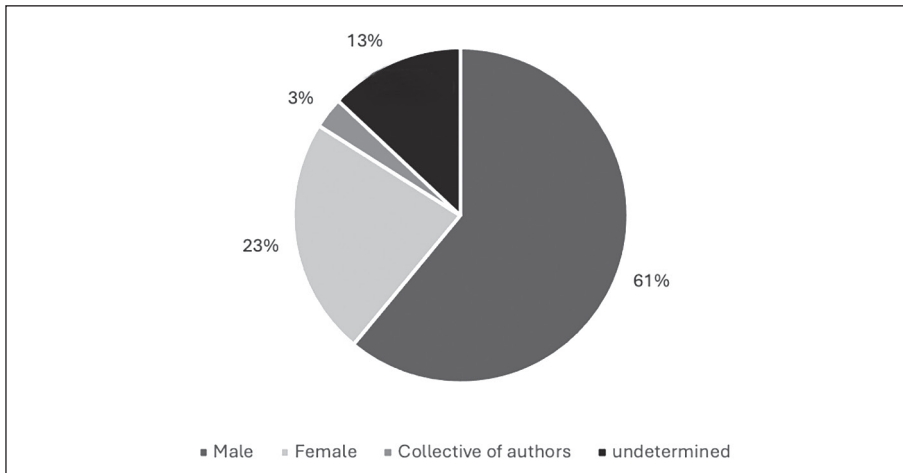


Figure 2 *The gender of the letter writers*



In terms of demographics, the letters reveal an interesting distribution. Seven were written by teenage girls, while 19 came from male writers. Four letters did not specify the sender's gender, and one was sent collectively by an entire school class. The class letter, written in anticipation of their upcoming *ballagás* (graduation ceremony) on May 8, was particularly compelling. The students requested a song by the Hungarian band Illés, "*Nem érdekel, amit mondasz*" ("I Don't Care What You Say"), dedicating it to their class teacher.

Beyond the song requests, their letter also conveyed the common concern of every graduating high school student all around the world—anxiety about the Matura, the high school final exams. The students openly shared their stress about their upcoming tests, which were scheduled for May 10–12, and wrote the following pseudonym/motto: “*Csak a vizsga sikerüljön*” (“May the exam go well”).

Every pseudonym used in the letters had its own origin, often reflecting something personal or meaningful to the sender—as it was read out on the programme instead of their names. Using pseudonyms allowed listeners to maintain a sense of anonymity while still making their letters feel personal and recognisable. In most cases, these names were created based on a shared experience with friends or a memorable trip they had in the past years. For example, one letter was signed by “*Gájfoszter és Dzsamebló a tengerpartról*” (“Guy Foster and Jam[es?] Blow [?] from the Seaside”), referring to a memory of a holiday on a Croatian beach, that a very young man shared in the anecdote section.

Value system of the songs

Beyond mere musical preferences, the songs that were requested on *Teenager Party* and *Délutáni Randevú* in 1971 revealed a deeper set of ideals that some young Hungarians found appealing. The translations and rewordings of the song titles themselves were of little significance to the listeners. Youngsters in Hungary were exposed to Western music and ideologies through The Beatles and The Rolling Stones, two of the most famous bands in the world. This gave them a glimpse into a culture that was completely different from their own.

It is important to note, that *cigányzene* (literally: “gypsy music”, although this should not be confused with authentic Roma folk music), for instance, though popular at the time, was absent from the song requests, which were mainly for Western or Hungarian beat bands. The reason was quite simple: Kossuth or Petőfi Radios (i.e., the state-controlled radio stations) played these types of music more frequently, even though they occasionally also included famous beat hits by Hungarian singers or bands. Traditional “magyar nóták” (“Hungarian melodies”) were more frequently listened to in rural areas. Instead, the emphasis in these requests to the RFE radio shows was on modern, Western-oriented music, or banned Hungarian beat songs.

Table 1 *Most requested artists*

1	The Rolling Stones	120
2	The Beatles	43
3	Elvis Presley	18
4	Illés	17
5	Led Zeppelin	14
6	Koncz Zsuzsa	13
7	Creedence Clearwater Revival	11
8	Black Sabbath	9
9	Omega	8
10	Deep Purple / Jimi Hendrix	6–6

The overwhelming popularity of The Beatles and The Rolling Stones in the letters sent to the radio stations suggests that their influence was far beyond entertainment. The Beatles, with 43 song requests, represented themes of love, human connection, and personal reflection (Leslie, 2025). The book *The Beatles, Popular Music and Society: A Thousand Voices* (Inglis, 2000) explores John Lennon and Paul McCartney's song-writing collaboration in The Beatles, examining how their songs emphasised individual feelings, romantic idealism, and peace—values that ran counter to the collectivist ideals that were common in socialist regimes. By emphasising emotional expressiveness and personal relationships, songs like *She Loves You*, *All You Need Is Love*, and *Yesterday* were popular with listeners all around the world, including in Hungary.

The Rolling Stones, on the other hand, were the wilder and more rebellious side of Western music (Marshall, 2024). With 120 song requests, they were even more popular than The Beatles, likely due to their energy, defiance, and passion. Their well-known song *You Can't Always Get What You Want* resonated with the young people's desire for freedom and opportunity against the limitations placed by the socialist government. The Rolling Stones symbolised rather reckless freedom and disobedience, which was especially exciting for the young, in contrast to The Beatles, who tended towards introspection and emotional depth. In four letters, teenagers shared stories where they did something illegal at the time. For example, one girl

around the age of 17 was heading home from a concert with her friends and around midnight there were no guards around the park, so they tore down beautiful red tulips, which was forbidden. Then they slept in the park and got back home just before dawn, without anyone noticing the missing tulips.

Teenager Party and *Délutáni Randevű*'s musical orientation was influenced by Hungarian beat bands as well as Western music. Thirty of the requested songs were for Hungarian artists, including Koncz Zsuzsa, Zalatnay Sarolta, and the bands Illés and Omega. These native artists established a link between traditional Hungarian and Western beat music. Although the impact of the West was indisputable, they developed their own musical style and wrote songs that sometimes ended up being banned due to the government's disapproval.

Beat music had a significant impact on the mindset of teenagers. 70% of British youth in the 1960s indicated that pop music, specifically beat music, profoundly affected their everyday mood and self-expression, demonstrating its substantial emotional and psychological influence. 62% of participants indicated that their fashion preferences and social identities were influenced by the Merseybeat movement, especially by renowned bands such as The Beatles (Gorkaltseva & Gozhin, 2016).

Certain musical genres frequently have an even greater impact in communities where they are prohibited. What happened after the Islamic Revolution in 1979 in Iran, when Western music was outlawed, record stores disappeared, and performance venues went silent, provides an appropriate analogy. Although anyone found in possession of "un-Islamic" music faced severe punishments under new Iranian law, underground markets thrived as people kept looking for these banned sounds (Euronews, 2022).

In similar ways, my assumption is that young Hungarians used beat music as an escape from reality and connected through its essence with their peers. Western beat music inspired people to dream outside the bounds of their political system, think for themselves, and explore their feelings—it is truly a musical revolution to be remembered.

Similarly, Generation Z (Gen Z, young people born between around 1997 and 2010) is currently in a musical revolution. According to the *Focus Generation Next* report by Horowitz Research (2024), 66% of Gen Zers stream music on a daily basis, highlighting the importance of music in their life. According to the survey, Gen Z's exposure to a variety of viewpoints

is reflected in their ability to interact with influencers from different racial, ethnic, and cultural backgrounds—thanks to their polycultural identities. Through streaming services, young people now have fast access to music from around the world, exposing them to a variety of viewpoints that question the established social mores.

Final considerations

Despite the constraints imposed by the communist system, teenagers in Hungary found ways to engage with and listen to Western pop music in the 1960s and 1970s. Through shows like *Teenager Party* and *Délutáni Randevú*, they were exposed to the latest songs from The Rolling Stones, The Beatles, and other popular Western bands, which served as essential gateways to a world beyond their own. Listeners would carefully arrange their recordings and requests, often using coded signals and pseudonyms/mottoes to avoid the accusations of too close an alignment with Western cultural materials.

Due to government censorship and frequent jamming, only specific radio sets—often smuggled or foreign-made—could pick up Western programmes like Radio Free Europe, making it difficult and a privilege to access Western music. Despite the risks, these shows, particularly *Teenager Party*, were extremely influential and extensively followed mainly because they provided young Hungarians their sole real-time exposure to Western pop and beat music.

According to my grandfather, listening was frequently a social or identity-forming activity for his generation. Adolescents usually listened to this music alone at home, then discussed it with others. Teenagers used Western music as a way of differentiating themselves.

Language barriers (around 1% of the population spoke English) did not lessen the music's emotional impact—song titles were often mispronounced or translated phonetically, yet the feeling still got through. The songs about love provided comfort, and the feeling of songs that were more rebellious, offered a whole new world—even if listeners only understood the titles. The letters, which included personal stories, song requests and complaints about the postal service, were written by a wide range of people, including adults and teenagers. Some even used song requests as means of expressing their frustrations or hopes, such as anxiety before exams.

The effect on teenagers, I conclude, was cultural and emotional, not openly political, but subconsciously made the capitalist Western world more appealing to them. For most youngsters, it was not about anti-regime protest but about discovering joy, identity, and connection in music from a world they could not otherwise access. For the younger generation, music was what gave them a sense of vitality, while older generations were likely more affected politically.

Overall, beat music influenced culture even when it was strictly regulated. Through music, Hungarian adolescents were able to discover personal independence and gently oppose isolation of the regime by emotionally connecting with Western values.

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Appendices

Appendix 1: Interview with my grandfather (transcript in Hungarian)

Szóval, papa, Te Tarcalon éltél egészen 20 éves korodig, igaz?

Igen, így van. Az általános iskolát Tokajon végeztem, de gimnáziumba már Szerencsre jártam. A gimnáziumi éveid alatt milyennek tapasztaltad a Teenager Party-t? Hallgattad vagy ismerted egyáltalán?

Annak idején, én ugye 1959–63-ig voltam gimiben, és ez [a Teenager party hallgatása] az 1962–63 időszakban volt ez jellemző, olyan 17–18 éves korunkra voltunk fogékonyabbak arra, hogy már külföldi adókat is fogjunk az egyébként csak korlátozott kis kapacitású kis rádiókon. Úgyhogy a mi osztályunkban is voltak osztálytársaim, akik rendszeresen egymás között beszélgettek és hát mi is hallottuk, hogy ugye hallgatják a Szabad Európa Rádiónak a Teenager Party zenei adását és műsorát.

Beszéltek bármilyen politikai véleményről, hogy például Amerikában sokkal jobb az élet, vagy hasonló?

Hát, politikai dolgokról ők nem szóltak, tehát ők ilyenekről nem számoltak be, hogy ki kit szidott,

meg politikailag mi volt, hogy volt. Kizárólag a zene volt az, ami az osztályban a beszédtema volt. Nem volt olyan orientációs ereje politikai értelemben a Szabad Európa Rádió hallgatásában. Nem volt világnézeti, ideológiai érzékelhető hatásuk. Lehet hogy későbbi korosztályoknál, akik tudatosabban hallgatták vagy a politikai mondanivalók iránt voltak inkább fogékonyak, azoknak befolyásolta a világnézetét. Nálunk inkább a szórakozás vagy a zene volt a középpontban.

Hányan beszélgettek rendszeresen a Teenager Party-ról és a zeneszámokról?

Hát nálunk a 32 fős osztályból egy olyan 3–4 fiú és 3–4 leányzó volt az, akik ennek a körnek a tagjai voltak és akik rendszeresen véleményt cseréltek meg élményeiket megosztották. Kérdezték egymást: ‘Hallottad-e a Szabad Európán ezt a számot meg azt a számot satöbbi, és akkor ezzel kapcsolatos véleményeiket osztották meg egymással. Figyelmeztették vagy emlékeztették egymást, hogy milyen számok lesznek legközelebb, mit érdemes hallgatni. De mondom, ez egy szűk kör volt, Szerencs egy vidéki kisváros volt, nem az ország középpontja, vagy megyeszékhely, a nagyvárosokban ez sokkal népszerűbb volt.

Te ismertél valamilyen ilyen népszerű zeneszámot?

Faluhelyen, mikor a gimiből hazament az ember Tarcslra, akkor egy-egy szám, kiemelkedő szám, amit slágerként fütyültek a srácok ott, de tulajdonképpen az ottani ifjúkori beszélgetések és találkozások során nem volt különösebben téma. Olyan vagány dolognak tűnt, hogy valaki az egyébként tiltott Szabad Európa Rádiót hallgatta, de nem tiltották nekünk lényegében a szülők sem, sem hogy hallgassuk vagy ne hallgassuk. Én tudtam néhány számot fütyülni, vagy énekelni, még ma is emlékszem néhány dallamra. Tehát nagy visszhangja nem volt, de azért beszívargott [a Teenager Party] de prózai, politikai jellegű beszélgetéseket nem indukált, amikor beszélgettek, akkor általában csak a zeneszámok értékeléséről esett szó.

Mennyire volt nehéz a Teenager Party-t hallgatni? Nem mindenki tudta hallgatni, ugye?

Hát, nehéz volt, mert a vidéken a Kossuthot, meg a Petőfit (rádiók) lehetett fogni, úgynevezett néprádiók voltak, ezek voltak elérhetőek, ezen nem volt rövidhullámú vagy ultrarövidhullámú vevőképeség, néhány helyen azonban voltak úgynevezett világvevő rádiók. Nekünk világvevő volt otthon, amikben egyébként a lámpákat kellett cserélni, ilyen régebbi típusú bonyolult szerkezetű, a helyi postás H.I. jött javítani, ha elnémult a készülék, és ki kellett cserélni a lámpákat.

Te akkor tudtad volna hallgatni a Teenager Party-t vagy bármilyen más Szabad Európa Rádió műsort?

Hát, mi elvileg tudtunk volna, de nem olyan minőségben jött be, egyszer-e egyszer én is megpróbáltam, de nem lehetett rendesen hallani, egyrészt mert zavarták, másrészt mert a készülék is régi volt, recsegett és minden baja volt. Én aztán nem voltam ennek híve, mert nekünk a faluban volt zenekarunk, amik a fesztiválokon, bálokon jó zenét produkáltak.

Milyenek voltak (személyiségileg) azok, akik rendszeresen hallgatták ezek a rádióműsorokat?

Olyan vagányok voltak, nem az a bezárkózott és ilyen magába zárkózott falusi gyerekek voltak, hanem ilyen nagydumás srácok voltak, mozgékonyabbak, szabadabb értékrenddel rendelkeztek, meg a lányok is, és ők tudták azt, hogy mások előtt, hogyha ők a SZER slágereit, dalgait hallgatják és ezzel egymás között is beszélgetnek, ez növeli a tekintélyüket. Egyébként nem voltak olyan kiváló tanulók, a lányok közül volt egyvalaki, aki jeles vagy kitűnő volt, de ezek a fiúk akik hallgatták, [konkrét neveket említ], ők olyan közepszerű, hármas, négyes tanulók voltak, nem kiemelkedők vagy kiválóak voltak. Aki kitűnő volt, az gondolom, a szabadidejében nem a SZER-t hallgatták. Nagy részük egyébként nem is mentek egyetemre, egy lány ment csak pedagógusnak, nem lettek befutott vagy közismert emberek.

Miben volt más az élet a Te meglátásod szerint, ami miatt vidéken nem annyira terjedt el a külföldi rádiók hallgatása, csak anyagi körülmények befolyásolták?

A családoknak sokszor nem volt pénze, otthon kellett melózni, az ember szünidőben is ment a Kőbányába meg a téeszbe [TSZ, termelőszövetkezet] dolgoztatni, ami volt egyéb szabadidő, akkor kimentünk a srácokkal focizni. Tehát, közösségibb volt akkor az ifjúsági élet, mert nem szorultál be a lakásba ilyen korszerű technikai eszközök okán, hogy videó meg ilyen rádió, meg telefonok, hanem egymás iránt voltunk nyitottabbak, a technikai függőség nem volt jellemző, mert nem is volt technika, egymást szórakoztattuk. Nem volt olyan, hogy közösen összeültünk és rádiót hallgattunk, hülyeségnek tartottuk a mi akkori felfogásunk szerint, nem volt rá szükségletünk, meg nem is értek el bennünket ezek a külföldi rádiók. Ezek a gazdagabb, jobb helyzetben lévő gyerekek (Bodrogkeresztúrból, Szerencsről vagy máshonnan) általában egyénien hallgatták, nem volt ilyen kör, akik együtt tudatosan leültek hallgatni, csak beszélgetésben került elő. [...] Aki már gimnáziumba bejutott, az már alapvetően nem volt rossz anyagi helyzetben, az a falu "krémjének" számított.

Mennyire értették a zeneszámokat? Volt fogalmuk arról, miről énekeltek?

A dalszöveget egyáltalán nem értették, azokat az angol kiejtésekkel, amit az énekes előadott, ezeket adták ők vissza. De amit a felvezetésnél meg a dal kapcsán elmondtak, azokat jegyezték meg, de dalszöveget egyáltalán nem értették. Ha magyar szöveget adtak le, az meg azért nem volt beszédtema, mert azt a Kossuth rádió is leadta, nem lett volna értelme azokról beszélni.

Utolsó kérdésem: ők nem írtak levelet a Teenager Party-ba?

Nekem nincs emlékem arról, hogy ők arról számoltak volna be, hogy kértek zeneszámot és azt lejátszották nekik, ebben az időben még nem volt hangrögzítő vagy csak nagyon kevés, 1970-re kezdtek el nálunk megjelenni, szóval nekik értelme se lett volna kérni, mert nem tudták volna mivel felvenni ezeket a számokat.

Appendix 2: A typical letter in its content and format (in Hungarian, [all author errors have been retained])

Kedves Cseke László

már nagyon régóta halgam az önök műsorát, mert jó számokat lehet hallani.

És enis elhatároztam magam hogy írok,

ha volna olyan szives leforgatni eszt a

pár lemeszt.

előre is nagyon szépen koszonom.

Erre a lyeligére:

Elektromos fokkefe

a számok:

Creedence Clearwater Revival - Izgalom

Bee Gees - Massachusetts

Illés - Nehéz várni

Beatles - Lady Madonna

Led Zeppelin - Fekete kutya

Black Sabbath - Vas ember

BRUCE WENBO ZHANG

Development of a Comprehensive Model for Propellant Cost Estimation in Mars Missions: Analysis, Evaluation, and Reduction Strategies

Abstract

Mars colonisation is considered a potential step for humanity's advancement towards an interstellar civilisation, and cost reduction represents a primary challenge for its feasibility. This paper highlights propellant cost as a component of total mission expenditure, reviews past propellant costs, examines their determinants and presents a cost breakdown model. The model yields a propellant cost estimate of approximately \$1.15 million for a 1,025-kilogram payload. A comparison with the literature data reveals a significant underestimation in prior work, largely due to insufficient consideration of the iterative property of structural mass. Furthermore, the paper discusses available strategies for propellant cost reduction, such as two types of hybrid propulsion systems, and estimates that the propellant cost could be reduced to approximately \$0.60 million when implementing these strategies.

Introduction

Space colonisation could be significant for the long-term advancement of humanity. It might serve as one of the means to support and ensure the survival of human race and its civilisation (Andersen, 2014; Barclay, 2017),

provide opportunities for resource extraction (Lewis, 1998; Mortillaro, 2023), stimulate progress in related technologies (Signe & Dooley, 2023; NASA, 2020), address overpopulation issues, and generate economic benefits from a larger perspective (Britannica, 2022; Makanadar, 2023). Equally importantly, humanity possesses an inherent curiosity about the unknown cosmos—driven by a craving for knowledge, a yearning for novelty, and an ambition to venture into new frontiers—an argument that dates back as early as Aristotle’s time (Angelis, 2007; Bell, 1895). These fundamental driving forces compel humanity to establish a living presence in outer space.

Among candidate destinations, Mars has emerged as one of the most viable targets, not only due to its relative proximity to Earth (with a minimum distance of approximately 55 million kilometers), and the existence of periodic launch windows every 26 months, but also because of several key similarities it shares with our own planet. These include a solar day of 24 hours and 39 minutes, an axial tilt of 25.19° that produces seasonal cycles, and a surface area comparable to Earth’s continental landmass. Despite its harsh environment characterised by a carbon dioxide atmosphere, average temperatures of -63°C , and surface gravity only 38% of Earth’s, these relative advantages position Mars as a prime objective for future human settlement efforts and a central focus of scientific research, including this paper (Belton, 2023; Drake, 2020; Zubrin, 1996).

A wide range of factors influences the likelihood of a successful colonisation mission. These can be categorised into five realms: technological; environmental; biological; economic and logistical; and legislative and ethical factors. Among these five realms, economic and logistical factors are particularly pivotal, as they determine and underpin both the feasibility and sustainability of the mission. Objectively speaking, the overall cost remains a key limiting factor of the mission, as it determines whether the mission could commence and proceed at all (Roseke, 2024). Moreover, the cost must be meticulously planned in advance to mitigate potential risks. Establishing a Mars settlement is prohibitively expensive, with estimates ranging from \$100 billion to \$500 billion for the initial periods alone—encompassing both direct expenses and implicit, or even unforeseen costs (Jones, 2016; O. Glenn Smith, 2015; Swanson, 2019; Zero Contradictions, 2025).

Given the immense cost involved, securing sufficient funding in the near future appears unlikely (Mullen & Lasky, 2024). Consequently, with-

out substantial cost reductions, this mission will remain theoretical (Hawthorne, Krauss & Associates, LLC, 1998). Cost reductions, on the other hand, would facilitate the launch of the mission, enhance overall feasibility, improve investment returns, and hence garner greater economic and political support worldwide (Goehlich, 2003; Jones, 2018).

Recognising the potential of Mars colonisation to advance humanity, alongside its economic difficulty and the importance of cost reduction, it is valuable to explore domains where cost-saving opportunities arise. As a proportion of the various expenses in space missions, the propellant cost consumed by the launch system represents a significant component. This paper focuses on this propellant cost, beginning with a review and analysis of historical data, followed by a detailed cost breakdown to help identify pivotal cost determinants, supported by estimates and comparisons under varying conditions. Finally, practical strategies for reducing propellant costs are proposed.

Methodology

The primary methodology employed is content analysis and deductive reasoning. The *Introduction* and *Literature Review* sections synthesise data from various sources to determine a reference cost figure based on past missions. In the *Theoretical Framework* section, general physics principles are applied to attempt to compute key figures, which are then cross-validated against external sources to minimise discrepancies and establish a reasonable cost estimate.

Subsequently, in the *Cost Estimation* and *Discussion* sections, the refined estimate is compared to the reference cost figure derived from *Literature Review* to draw a *Conclusion*. The majority of key sources are retrieved from Google Scholar and NASA, with search keywords such as “mars mission delta-v” and “delta-v map”.

Literature Review

A total of approximately fifty Mars missions have been conducted to date (Malin et al., 2019; NASA, n.d.). Presently, nine vehicles are exploring Mars,

uding two rovers¹ and seven orbiters² (International Mars Exploration Working Group, n.d. ; The Planetary Society, n.d.). The propellant expenses associated with the Mars Science Laboratory (MSL) and Mars 2020 missions are extensively studied, as both missions successfully reached Mars' surface (BBC News, qtd. in Amos, 2012; 2021), making them more comparable to Mars colonisation missions in terms of objectives and complexity.

The more recent of the two, Mars 2020, was budgeted at \$2.8 billion, with \$243 million for launch services (Dreier, 2020), covering costs associated with the launch service, spacecraft and spacecraft power source processing, planetary protection processing, launch vehicle integration, and tracking, data and telemetry support (NASA, 2016). The propellant cost is likely embedded within the "spacecraft and spacecraft power source processing" category, constituting a portion of the overall launch service cost. Unfortunately, a more detailed breakdown or specific propellant cost figures are not explicitly stated. On the other hand, MSL operated with a total budget of \$2.53 billion (Brown et al., 2011; The Planetary Society, 2024), while similarly, the exact propellant cost is not separately disclosed in NASA's publicly available budget analyses.

Due to the absence of direct sources, an alternative measure is examining the propellant consumption of the launch vehicle used to carry the spacecraft. The rocket model employed in both missions was Atlas V 541 (United Launch Alliance, n.d.). According to its user guide, each launch consumes 20,830 kg of LH₂/LO₂ mixture, 42,630 kg of HTPB solid propellant as well as 284,089 kg of LO₂/RP-1 mixture.

The LH₂/LO₂ mixture typically has an oxidiser-to-fuel ratio ranging from 5.3 to 5.9, while LO₂/RP-1 mixture has a ratio of 2.56 (Vitz et. al, 2016; Astronautix, n.d.). By isolating the mass components based on these ratios and applying the respective unit prices, cost of propellant consumed by Atlas is estimated to be \$1,622,621.8 (NASA, 2018; Seibert, 2025; United Launch Alliance, 2010).

Once the spacecraft reaches Mars' vicinity, the Entry, Descent and Landing (EDL) stage is executed by separate systems (NASA, 2024a; NASA, n.d.; Clark, 2020). The calculated cost above does not account for the propellant consumption of those systems, therefore, the actual total propellant cost is

¹ Curiosity and Perseverance

² Mars Odyssey, Mars Express, Mars Reconnaissance Orbiter, MAVEN, the Trace Gas Orbiter, the Hope Mars Mission, and the Tianwen-1 Orbiter

likely higher. Despite this, any significant excess is not expected, as during the mission, the majority of propellant is consumed by the launch vehicle in the initial stages (NASA, 2024).

It is worth noting that direct propellant cost data from previous Mars missions are largely unstated or classified, often due to a lack of transparency or an overemphasis on studying and reporting the overall cost. The absence of detailed information also restricts the accuracy of cost estimations. To overcome this limitation, this research incorporates orbital mechanics to develop a more comprehensive and universal cost model for Mars missions, thereby aiming to provide estimations from a more technological perspective.

Theoretical Framework

The approach to estimating propellant expense for Mars missions involves calculating the total propellant consumption throughout the mission and multiplying it by the unit price of the propellant. While liquid propellants can be measured in litres and solid ones in cubic metres, mass units—such as kilogram—offer a more consistent metric, as it remains unchanged regardless of the propellant's phase. Therefore, the key to this estimation is determining the total propellant mass required for the mission.

Mars Mission Timeline

The timeline of a Mars mission from departure from Earth to arrival at Mars can be divided into three main stages: launch, cruise, and landing (Erickson, Manning & Adler, 2004). I will use Mars 2020 as an example, in which the launch phase began with an Atlas 541 rocket powered by an RD-180 main engine and four Aerojet Rocketdyne solid boosters propelling the spacecraft off Earth. As the rocket ascended through the dense lower atmosphere, it underwent stage separation, during which the main engine and boosters were cut off and jettisoned.

Following this, two ignitions of the Centaur RL10C-1 engine were performed. The first one placed the spacecraft into an initial parking orbit near Low Earth Orbit (LEO³), while the second provided the velocity needed to escape Earth's gravity and enter an elliptical Earth-Mars transfer orbit.

³ defined in this paper as the orbit at 400 km altitude above Earth surface to represent a typical parking altitude for interplanetary missions, exemplified by the International Space Station (ISS) (Stewart, 2025)

Once the spacecraft settled on its designated trajectory, the Centaur engine also separated, leaving the spacecraft to continue its journey toward Mars (Clark, 2020).

The transfer orbit entered is known as the Hohmann Transfer Orbit (HTO) (Cook, 2020), which is elliptical, heliocentric, and tangent to Mars' orbit. It is achieved by precisely increasing the spacecraft's velocity by the optimal amount at the appropriate moment in LEO. When timed accurately, this manoeuvre ensures that the spacecraft reaches Mars at the point where HTO intersects its orbit.

The cruise stage of Mars 2020 on HTO lasted approximately 200 days (NASA, 2020). During this stage, the spacecraft coasted by inertia, requiring no propulsion to maintain its motion. Engineers on Earth closely monitored the spacecraft's physical condition and executed any necessary trajectory corrections.

As the spacecraft approached Mars, it performed the Mars Orbit Insertion (MOI) manoeuvre to be captured into orbit. This was followed by the highly complex EDL stage—the “seven-minute terror”—to achieve a secure and precise touchdown onto the site (NASA, 2020).

Although trajectory parameters vary across missions, this approach is widely recognised for its efficiency in both time and propellant consumption. It has been utilised in numerous missions by NASA and other space agencies (Topputo & Belbruno, 2015).

Throughout the journey, rocket propellant is primarily consumed during the orbital manoeuvres. During the launch stage, the rocket generates sufficient thrust to overcome Earth's gravity; during the cruise stage, the propulsion system facilitates various trajectory manoeuvres and velocity adjustments; during the landing stage, the spacecraft relies on its onboard propulsion system to assist with the descent and landing. Regarding the different orbital transitions, the mission process can be further divided into four stages:

1. Ascent from Earth's surface to LEO.
2. Transfer from LEO to HTO targeting Mars.
3. Transfer from HTO targeting Mars to Low Mars Orbit (LMO).
4. Descent from LMO to Mars' surface.

Estimating the propellant mass required for each stage provides a comprehensive answer to the research question of the total propellant cost.

Estimation Approaches

Several approaches are available for determining the propellant mass for a space journey. Two are introduced here:

1. Orbital energy approach. This method involves calculating the orbital energy of the spacecraft in the initial and final orbits, then determining the difference between the two energy figures. This energy difference represents the required change for orbit transfers, from which propellant mass can be estimated. This approach comprehensively captures the full physical picture of the mission, and it helps to comprehend the mechanics behind the motions of the spacecraft.
2. The Tsiolkovsky Rocket Equation, expressed as (Gika Megawan Pramudita, 2023):

$$\Delta V = V_e \ln \left(\frac{m_0}{m_f} \right) \dots\dots\dots (1)$$

where ΔV represents the change in velocity of the spacecraft, V_e is the effective exhaust velocity of the propellant, m_0 is the initial mass of the rocket including propellant, and m_f is the final mass of the rocket after the propellant has been ejected.

This equation directly relates key variables to the question, including the propellant mass—which is the desired outcome—the velocity change of the spacecraft, and the exhaust velocity of the expelled material. Unlike the orbital energy method, it focuses more on the practical aspect of propellant consumption. In order to deduct the propellant mass using this equation, the velocity changes during orbit manoeuvres must be known.

Since the primary aim of the research is to estimate the propellant cost of a Mars mission with an emphasis on practical aspects rather than theoretical mechanics, the second method will be employed. It is important to note that both methods neglect certain real-world parameters, such as gravity losses, air resistance and trajectory deviations. Efforts will be made to identify and minimise deviations, but some degree of inaccuracy is still expected to remain.

Determining the changes in velocities

As discussed before, the change in velocity, or the delta velocity is essential for deriving propellant mass when using the Tsiolkovsky Rocket Equation.

Therefore, major velocity increments (V s) associated with each stage are calculated to solve for the final propellant mass.

1. The first major velocity increment ΔV_1 , required for performing the manoeuvre of ascending from the Earth's surface to LEO. The theoretical minimum ΔV for this manoeuvre can be estimated through orbital mechanics, but in practice, significant additional ΔV is required to overcome atmospheric drag, gravity losses and other resistances during the ascent.

The orbital velocity at an altitude of 400 km is given by (HSC Resources, 2019):

$$V_{\text{orbital}} = \sqrt{\frac{GM}{R}} \approx 7.67 \text{ km/s} \dots\dots\dots(2)$$

where G represents the gravitational constant, M is the mass of the Earth, and R is the orbital radius⁴.

Realistically, achieving this orbit requires a total velocity increment greater than the final orbital velocity. A widely used engineering estimate for the total ΔV needed to reach LEO, which comprehensively accounts for orbital velocity, gravity and steering losses and atmospheric drag, is approximately 9.0 km/s to 10.0 km/s (Chung, 2022; Sarigul-Klijn, Sarigul-Klijn & Noel, 2005; Karabeyoglu, 2019;). For the purposes of this paper, an average value is adopted:

$$\Delta V_1 \approx 9.5 \text{ km/s} \dots\dots\dots(3)$$

2. The second major velocity increment V_2 , required for performing the so-called Trans-Mars Injection (TMI) manoeuvre, the burn that propels the spacecraft to transfer from its parking location in LEO onto HTO targeting Mars.

This burn aims to provide the spacecraft with a specific velocity vector relative to Earth right after it arrives at LEO. This velocity is precisely calculated so that after the spacecraft escapes Earth's gravitational influence, its velocity relative to the Sun perfectly matches the required perihelion velocity of the heliocentric, elliptic HTO targeting Mars.

A typical mistake when calculating the change in velocity in this stage is algebraically adding the change in velocity needed to escape the Earth from LEO and that needed to enter HTO targeting Mars from

4 Earth's radius plus 400 km altitude

a random orbit circling the Sun, as this estimation confuses different reference frames and ignores the fact that velocity is a vector.

A correct approach here is using the Vis-viva Equation within the Sun's reference frame to compute the vectorial sum of velocities during the orbit transfer.

Instead of replicating this complex multiframe calculation, this paper adopts the standard value for the ΔV of this manoeuvre (Chung, 2022; Woolley & Barba, 2022):

$$\Delta V_2 \approx 4.0 \text{ km/s} \dots\dots\dots(4)$$

Note that this value is greater than ~ 3.4 km/s which was a result obtained merely from simple addition under different frames, as this simplified calculation process fails to account for the extra energy consumed when transferring.

3. The third major velocity increment ΔV_3 , required for performing the MOI manoeuvre, resulting in the transfer from HTO targeting Mars to LMO.

After successfully entering the heliocentric HTO, the spacecraft coasts for most of its journey to Mars, travelling primarily with its inertia, with no need for additional propellant ignitions. Following Kepler's second law, it will continuously decelerate when gradually approaching the aphelion of its transfer trajectory during the journey.

Upon reaching the vicinity of Mars, the spacecraft must be captured into Mars' orbit. A common misconception is that the spacecraft will fall into Mars if it gets close, while the reality is more nuanced. As the spacecraft approaches Mars, it is drawn in by its gravity and gains more velocity. If its velocity is too high, it will simply swing around Mars like a slingshot and be thrown back into space, following a distinct hyperbolic trajectory. It will not fly off to somewhere infinitely far but will continue to orbit the Sun as a man-made asteroid.

To avoid this and be successfully captured, the spacecraft must reduce its velocity. The physics behind is as follows: when the spacecraft arrives at Mars' gravitational influential area, it has a significant speed relative to Mars (known as hyperbolic excess velocity), typically around 2.6–2.7 km/s for a Hohmann transfer (Jedrey, Landau & Whitley, 2015). To transition from this fly-by trajectory to a closed orbit around Mars, the spacecraft must slow down below Mars' escape velocity at its clos-

est approach to Mars (*periapsis*). This is achieved by firing its engines in reverse (in other words, executing a retrograde burn). The required velocity change (ΔV) depends on the final desired orbit. For a relatively low and circular orbit, a larger ΔV is needed; in contrast, for a high and elliptical orbit, a smaller ΔV would be sufficient. For this mission, the goal is to establish the relatively low, circular and stable LMO directly. According to existing literature, achieving this typically requires ΔV between 2.5 km/s and 2.7 km/s (Longhurst, 2021; Woolley & Barba, 2022). For the purposes of this paper, an average value is adopted:

$$\Delta V_3 \approx 2.6 \text{ km/s} \dots\dots\dots (5)$$

4. The final major velocity increment ΔV_4 , required for performing the EDL manoeuvre—the powered descent and landing manoeuvre from LMO onto the Martian surface.

The process of landing on Mars has a crucial advantage: Mars has an atmosphere that acts as a free braking system.

The EDL sequence has two steps:

1. It starts with atmospheric entry, when the spacecraft plunges into the Martian atmosphere at very high speed. Friction and atmospheric drag act like a natural brake, reducing the velocity of the spacecraft. Once the velocity is sufficiently reduced, a supersonic parachute is deployed to further slow the spacecraft down. This step requires no propellant usage (Li & Jiang, 2014).
2. Shortly later, when the spacecraft is close to the ground and moving at a relatively lower speed, its own thrusters are fired. This final burn provides precise control and soft touchdown at the designated landing site.

Therefore, the velocity increment (ΔV) that must be provided by the spacecraft's own propellant is solely for this second step. In reality, some backup propellant will also be prepared in advance for minor adjustments. Based on existing literature (Palaszewski, 2022), the ΔV required for this final stage is relatively small:

$$\Delta V_4 \approx 0.7 \text{ km/s} \dots\dots\dots (6)$$

Up to this point, the changes in velocity in a Mars mission have been cited and explained. The next step is substituting these values into the Tsiolkovsky Rocket Equation to estimate the propellant consumption and propellant cost.

Cost Estimation

In the Tsiolkovsky Rocket Equation, the outcome of interest—the propellant mass—is:

$$m_{\text{propellant}} = m_0 - m_f \dots \dots \dots (7)$$

Rearranging the equation:

$$\frac{m_0}{m_f} = e^{\frac{\Delta v}{V_e}} \dots \dots \dots (8)$$

The initial mass, or in other words, the mass of the spacecraft at the beginning of each stage, before orbital manoeuvres, can be expressed as:

$$m_0 = m_f \cdot e^{\frac{\Delta v}{V_e}} \dots \dots \dots (9)$$

There are four ΔV s. The final mass m_f after the last manoeuvre corresponds to the spacecraft's payload. The initial mass m_0 before the last manoeuvre can be computed and subsequently used as the final mass for the preceding manoeuvre, and so on.

Let m_i represent the spacecraft's mass after manoeuvre i , which results in a delta velocity ΔV_i , and let m_{i-1} denote its mass before that manoeuvre. This recursive relationship is:

$$m_{i-1} = m_i e^{\frac{\Delta V_i}{V_e}} \text{ in which } i = 1, 4 \dots \dots \dots (10)$$

In the equation, the average exhaust velocity V_e is given by:

$$V_e = I_{sp} g_0 \dots \dots \dots (11)$$

where I_{sp} represents the specific impulse, and g_0 the standard gravitational acceleration.

The propellant cost required to transport unit mass from Earth to Mars using launch vehicles similar to Mars 2020 is estimated, by setting the payload mass as:

$$m_f = m_4 = 1 \text{ kg} \dots \dots \dots (12)$$

This implies that after landing on the Mars' surface, all propellant is assumed to be consumed, leaving only 1 kilogram remaining.

As in Mars 2020, after the first stage, the main engine is jettisoned; after the second stage, the upper stage, Centaur is jettisoned. Consequently, their masses are counted as temporary payloads in the estimation.

Here is a table containing the m_p , ΔV and V_e figures during the 4 stages, with their respective initial mass calculated using the Tsiolkovsky Rocket Equation:

Table 1 Important parameters during 4 stages of Mars mission with 1 kg payload

	V during this stage (km/s)	$I_{sp} (s) / V_e$ (km/s)	m_f (kg)	m_o (kg) ⁵
4th stage	0.7	310 / 3.0	1.0	1.3
3rd stage	2.6	310 / 3.0	1.3	3.0
2nd stage	4.0	450 / 4.4	3.0 + 2247 ⁶	5,585
1st stage	9.5	285 / 2.8 ⁷	5,585 + 21,351 ⁸	800,800

Sources: United Launch Alliance, 2010; United Launch Alliance 2017

Therefore, the initial mass is:

$$m_o \approx 800,800 \text{ kg} \quad (13)$$

Subtracting the launch vehicle mass and payload mass yields pure propellant mass:

$$m_{\text{propellant}} = m_o - m_f \approx 777,200 \text{ kg} \dots\dots\dots (14)$$

To account for potential uncertainties in the propellant mass estimation—primarily arising from deviations in engine performance (specific impulse, represented by exhaust velocity, V_e) and required ΔV —a sensitivity analysis was conducted. The values of V_e and ΔV were independently set to differ by -1% and $+1\%$, respectively from their nominal values. This difference resulted in a 7.7% change in the total required propellant mass. Consequently, 7.7% is adopted as the percentage uncertainty for the final propellant mass estimate.

Consequently, the propellant mass after error propagation, taking uncertainties into account is:

$$m_{\text{propellant}} \approx 777,200 \text{ kg} \pm 60,000 \text{ kg} (\pm 7.7\%) \dots\dots\dots (15)$$

The propellant used in the main engine is LOX/RP-1, a mixture consisting of liquid oxygen as the oxidiser and liquid kerosene as the fuel:

$$m_{\text{propellant}} = m_{\text{oxidizer}} + m_{\text{fuel}} \dots\dots\dots (16)$$

The typical oxidiser-to-fuel mixture ratio is 2.56:1 (Vitz et. al, 2016), indicating that in the initial mass, the oxidiser and fuel masses are approximately:

⁵ equal to m_i of the preceding stage

⁶ mass of upper stage Centaur

⁷ estimate based on burn ratio

⁸ mass of main engine

$$m_{\text{oxidizer}} \approx 558,900 \text{ kg} \pm 43,100 \text{ kg} \dots\dots\dots (17)$$

$$m_{\text{fuel}} \approx 218,300 \text{ kg} \pm 16,900 \text{ kg} \dots\dots\dots (18)$$

The unit price of liquid oxygen (up_{oxidizer}) and liquid kerosene (up_{fuel}) is the following (Space Insider, 2025; Wade, 2019):

$$up_{\text{oxidizer}} = 0.27 \text{ \$/kg} \dots\dots\dots (19)$$

$$up_{\text{fuel}} = 2.3 \text{ \$/kg} \dots\dots\dots (20)$$

The total price (P_{total}) is therefore the sum of the costs of the two components, calculated as the unit price multiplied by the mass. Substituting the values results in:

$$P_{\text{total-1kg}} = \$ 653,000 \pm \$ 50,500 \dots\dots\dots (21)$$

The propellant mass for the Mars 2020 mission can be calculated as well. Given that the mission’s payload has a mass of 1,025 kg (Jet Propulsion Laboratory, n.d.), applying it as the m_f of the fourth stage and using the same approach yields the initial propellant mass:

$$m_{\text{propellant-Mars 2020}} \approx 1,363,700 \text{ kg} \pm 61,900 \text{ kg} \dots\dots\dots (22)$$

Subtracting the vehicle and payload mass yields pure propellant mass:

$$m_{\text{propellant-Mars 2020}} \approx 1,339,000 \text{ kg} \pm 61,900 \text{ kg} \dots\dots\dots (23)$$

Using the unit price figures, the propellant cost for the Mars 2020 mission is calculated:

$$P_{\text{total-Mars2020}} = \$ 1,145,600 \pm \$ 52,200 \dots\dots\dots (24)$$

Discussion

Evaluation

A comparison between the propellant cost calculated by the simplified Tsolkovsky Rocket Equation model used in this research and actual published data cited in the *Literature Review* revealed a discrepancy of approximately 29.4% on average, although the estimate is expected to be higher than the literature data in the *Literature Review*. Therefore, this section will investigate the potential sources of this error and assess the model’s limitations and its remaining value.

It is proposed that the error primarily comes from the following sources:

1. While the model incorporates structural mass, it treats the final mass (m_f) of each stage as a fixed input. In reality, a key component of m_f —the structural mass of the stage itself—is dynamically cou-

pled to the propellant mass. A larger propellant mass necessitates larger tanks and stronger airframes, increasing the stage's structural mass. This increased structural mass requires additional propellant to achieve the same ΔV in turn, creating a positive feedback loop. The presented model does not account for this coupling. It calculates the initial mass based on an unchanging final mass, thereby underestimating the compounding mass growth when mission parameters (e.g. ΔV) change. This is likely the primary contributor to the discrepancy, as the model avoids the iterative calculation required to resolve the interdependence between propellant mass and the structural mass of the same stage.

2. The specific impulse I_{sp} , and consequently the exhaust velocity V_e of a realistic engine is not constant either, and may vary with altitude, nozzle shape and many other factors. In the proposed model a single I_{sp} figure of altitude sea level is taken throughout the calculation. This may result in discrepancies as well.

Despite the quantitative discrepancy, the simplified model employed in this study retains value for qualitative analysis. It successfully demonstrates the core determinants of propellant mass in space missions, the sensitivity of rocket performance in response to minor changes in V_e or ΔV , and points out facts such as the propellant is the primary cost driver for the propellant instead of the oxidiser, despite its larger mass fraction. Therefore, the model remains valid as a powerful conceptual tool and a starting point for understanding rocket design.

Further research and studies could be done to significantly improve the model's accuracy, by taking the iterative property of structural mass into account, or by detecting and correcting other courses of errors.

Cost Reduction Strategies

Although propellant cost does not constitute a dominant proportion of total mission cost, minimising it remains significant in the long term. In the rocket equation, ΔV remains constant regardless of the spacecraft's mass. The payload mass is fixed once the spacecraft is constructed. The initial mass is a dependent variable that involves the propellant mass, and it must be minimised to reduce mission cost. It is deduced that the only viable approach to decreasing it is by increasing the rocket engine's exhaust velocity

V_e , and the determinant of V_e is nothing but the specific impulse (I_{sp}) of the rocket engine. Therefore, increasing the specific impulse is necessary to lower propellant cost.

Several strategies have been proposed to reduce propellant cost, including the use of advanced propulsion technologies or more effective types of propellants. LOX/RP-1 chemical propulsion remains a conventional approach, with relatively low I_{sp} . Currently, more advanced propulsion systems—such as nuclear thermal propulsion, ion propulsion, and fusion propulsion—are under development. Since the latter two are incapable of generating sufficient thrust to lift a spacecraft off Earth, they must be integrated with other propulsion technologies in a mission, forming what is known as hybrid propulsion (Douglas & Bourque, 1989; Kaushik, Katwale & Sakore, 2022). Here is a table comprising two potential strategies, their I_{sp} figures, the propellant consumption, and their respective costs deduced from the model proposed above, payload mass taken as 1,025 kg:

Table 2 *Advanced propulsion technologies and their costs*

Types of strategies	$I_{sp} (s) / V_e$ (km/s)	Propellant mass (kg)	Cost (\$)	Percentage of cost reduced
Hybrid propulsion mixing chemical & ionic propulsion	Chemical: 450 / 4.4 Ionic: 4190 / 41	218,700	603,000	47.4%
Hybrid propulsion mixing chemical & fusion propulsion	Chemical: 450 / 4.4 Fusion: 55,000/ 539 ⁹	215,100	536,800 ¹⁰	53.1%

Sources: Adams, Polsgrove & Brady, 2002; Lindley et al., 2023; Reckart, 2023; NASA, 2023; SETS, 2024

It can be inferred that propellant and propulsion technologies hold significant potential for reducing costs in space missions, and these technologies are advancing rapidly. Due to the scope of this paper, an in-depth analysis of the determinants of the specific impulse will not be conducted.

⁹ the mean value from the source is taken as the estimate

¹⁰ the unit price of fusion propellant is obtained by converting its power to mass in the most minimal scenario

Conclusion

The propellant expenditure for Mars missions is determined by calculating the change in velocities at different mission stages and applying them along with other parameters to the Tsiolkovsky Rocket Equation. The primary cost determinants are identified through an analysis of the equation's variables. According to the existing literature, the total propellant expense required for a 1,025 kg payload is approximately \$1.62 million. While based on the estimation model, it is approximately \$1.15 million. The major sources of discrepancy are also evaluated.

Two strategies for mission cost reduction are proposed. These two strategies optimise the launch vehicle propellant composition structure by mixing advanced propulsion technologies with conventional methods. They appear to be relatively promising in reducing expenditures, and are estimated to cut the cost by around half, providing novel possibilities for Mars missions.

Arthur C. Clarke once said, "The only way of discovering the limits of the possible is to venture a little way past them into the impossible." (Clarke, 2000) Therefore, with continuous advancements in technology across multiple fields and unwavering determination, unparalleled bravery, and relentless curiosity, I believe humanity will eventually establish settlements on Mars and evolve into a multi-planetary species.

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BENDEGÚZ RUSKAL

The Non-financial Means of Including Roma in Hungarian Higher Education

Introduction

Roma are reported to be the most stigmatised and discriminated group throughout Europe (Eurobarometer survey, 2023). This, by nature, along with their double minority status—being an ethnic community with cultural differences as well as a disadvantaged group from a socioeconomic perspective (Forray, 2013)—leads to Roma students being the most underrepresented in higher education (Varga et al., 2024). This situation is especially grave in Hungary, where among Roma aged 15–24, only 1.3% participate in higher education as opposed to 19.8% in the non-Roma population as of 2021 (Holló, 2021).

As the issue of educational underrepresentation itself is polarised and highly complex, literature isn't able to identify one main factor as the root cause (Maganó & Mendes, 2021). Thus, the tools of aid are not evident at first sight. The most traditional way of assistance is financial aid. However, studies in the field suggest that non-monetary methods might even be of more significance to the young Roma pursuing studies in higher education (Forray, 2013).

The following research aims to employ an interdisciplinary approach, combining economic, sociological, political, and psychological practices, relying on past studies with the most diverse procedures and backgrounds. It operates with both survey-based statistical analysis and qualitative research, grounded on interviews conducted with leading experts in the field as well as Roma students with firsthand experience.

Through the aforementioned process, my objective is to explore how current and past Roma students in higher education in Hungary perceive non-financial means of aid (mainly: internships, mentorship programs, a peer community from similar backgrounds, and opportunities to study their history and culture), and whether they feel that non-financial means of aid can be of similar or greater service as scholarships and economic subsidies.

Literature review

As a result of the issue of Roma educational underrepresentation being highly complex (Merchán-Ríos et al., 2023) and debated, it is crucial to procure information and findings from the most diverse array of academic literature possible so as to avoid biases. Thus, I only derive conclusions that are universally accepted throughout studies of differing backgrounds, whose differences I further explore in this section. Not only are there divergent opinions regarding the main source of the issue, but there is also no consensus on how it should be monitored.

Scholars typically attribute the root of the difficulty either to the cultural and socioeconomic differences of Roma or to institutional discrimination, meaning that the schooling institutions themselves are those that make studies burdensome or inaccessible for them (Magano & Mendes, 2021).

There are also two schools of thought regarding the methods to track progress and measure the scope of the underrepresentation. Certain studies, as a result of the complexity of the topic, utilise or call for qualitative monitoring (Curcic et al., 2014; Magano & Mendes, 2021), whereas others point to the lack of proper context-based quantitative surveys (Roma Civil Monitor, 2023).

This paper reviews literature using both qualitative and quantitative approaches, aiming to put the thorough personal stories into perspective by examining how common these cases are with statistical methods. Furthermore, the papers I studied have also proved to be quite diverse, seeing that they primarily attribute the issue to distinctly different factors. The objective of using such a differentiated pool of sources is to find common ground regarding possible remedies for the disadvantaged status in education that the Roma have endured.

Economic argument for providing non-financial aid

The reason for granting non-financial aid specifically to the Roma instead of generally to the disadvantaged, seeing that the Hungarian state has a tendency not to treat them separately (European Commission, 2023), might not be evident at first. Since it is fundamental to be able to understand the reasons behind the goal before discussing the means of achieving it, in the following section of the paper, I provide a rationalised economic line of argumentation as to why this aim is universally desirable.

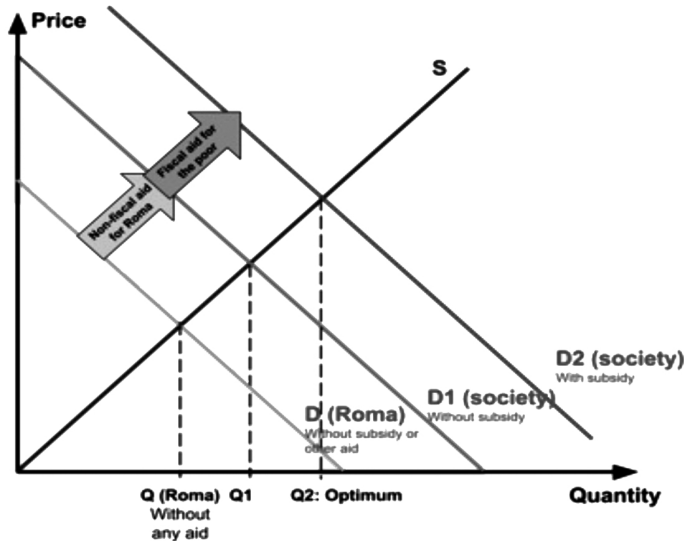
The core principle behind the state subsidising education generally has to do with so-called ‘externalities’ that are the external effects of the trade. Though in economics it is largely accepted that markets are, as a general rule, good regulators of finding the optimal quantity and price for particular products and services (Smith, 2018), there are cases in which they are not. The most common instances are externalities, and one of their most often referenced examples is education. In the market of higher education, universities decide what quantity of education they would offer at different prices, generating the supply function. On the other hand, the potential students are weighing the cost of education against the benefits it would provide them, generating the demand function. The emphasis is on ‘them’. Even though where the supply-and-demand curves meet is said to be the ideal price and quantity for those participating in the trade, it does not take into account the ‘external’ effects that the trade has on broader society. In the case of education, people learning ultimately results in not only the individual students acquiring more knowledge and better prospects, but also in them being generally more useful for all of society, potentially making discoveries capable of changing countless lives. Consequently, the societal optimum quantity of education is, by standard, going to be larger than what the market would produce by itself. This is the reason why states tend to subsidise education in the first place, encouraging people who otherwise could not afford it, generally from poorer socioeconomic backgrounds, to pursue further education (Mankiw, 2015).

Now, even though this rationalises why Hungary should aid people from more modest backgrounds in education, it does not make it apparent why such programs should differentiate between Roma and non-Roma. However, as asserted by a number of the most prominent researchers on the topic, Roma have an additional cost of acquiring education and the social mobil-

ity that comes with it (Durst et al., 2023). Most of this further ‘cost of mobility’ is extensive social and psychological pressure coming partly from the socially mobile Roma feeling alien to and alone in their new environment, experiencing a feeling of betrayal towards their original community, and the stigmatisation and discrimination they receive from their new environment. Many of them refer to themselves as ‘cultural migrants’ (Durst et al., 2023). This increases the overall “1price1” (in a broad sense of the word) of their education, further deviating the market quantity from the optimum. This revelation not only justifies aid programmes targeting Roma specifically but also gives a strong argument that— since the extra cost they face is not financial—the help offered shouldn’t solely be economic either.

Figure 1 below shows a theoretical graph of the supply and demand of higher education among Roma. The graph suggests that since the original demand, D (Roma), is already lower than the majority society’s demand, $D1$ (society), conventional, ethnically universal government subsidies (*Fiscal aid for the poor*) are not sufficient to shift the demand of Roma into the optimum, therefore they should also receive support specifically targeting them (*Non-fiscal aid for the poor*).

Figure 1 Supply and demand of higher education among Roma



Note: None of the proportions on the graph are representative. It is an illustration.

Organising initiatives at lower levels of governance

One aspect in which the fragmented literature seems to show a united front is in how they explain the discrepancy between different levels of decision-making. The phenomenon with supporting Roma is typically that lower levels of governance—even down to the level of individual decisions—handle initiatives or agendas from higher levels less seriously. For this, we can find various instances on a diverse scale. Curcic and colleagues (2014) point to how loosely the EU's Roma inclusion initiatives are implemented on national levels, exemplifying it with the Roma Decade, during which many countries pledged to take significant action and ended up without tangible outcomes. This finding is further supported and elaborated by a historical example in Hungary, where after 2004, during the desegregation period, there appeared to be a formal, politically correct 'project language' as well as an informal, more opaque 'language below' employed in characterising schools, which, in contradiction to the official narrative of integration, was defined by prejudice, not willing to follow the sudden shift in policy direction (Papp & Neumann, 2021). This tendency is illuminated even further by reports from Portugal and Central and Eastern Europe that show how numerous teachers associate the Roma's failures in education with their 'ignorance' rather than institutional and other factors. Such attitudes can result in self-fulfilling prophecies (Magano & Mendes, 2021). Thus, we can conclude that non-policy solutions are often an effective way to realise minor, yet important goals of supporting Roma, since—as previously discussed—measures originating from higher governmental levels frequently remain unexecuted. However, it is also important to note that isolated projects are less likely to bring change at scale than policies (Curcic et al., 2014).

Examining potential non-monetary solutions

According to preliminary literature, internships are suggested to play a key role in helping Roma students' educational continuity at university level by demonstrating how their studies will transfer onto the labour market (Magano & Mendes, 2021). This is vital, since professional prospects tied to pursuing education are said to be of paramount importance among Roma (Curcic et al., 2014), seeking social mobility through schooling. Furthermore, literature also suggests that the practice of internships could help

their own community understand why individuals choose a path that often seems alien to members of their original environment and their family, especially in the case of first-generation graduates (Durst et al., 2023). Seeing the way that studies transfer onto the labour market may not be apparent for all Roma students, Magano and Mendes (2021) suggested that internships might serve as effective tools to achieve this.

The largest consensus in current academia is regarding the missing example figures of Roma. Most studies that attempt to reveal some aspects of what makes Roma underrepresented in education, no matter what they attribute the origin of the issue to, or cultural and institutional factors, or what tools they employ to research it, agree that one of the most crucial problems is the lack of role models (Curcic et al., 2014; Lafferthson et al., 2002; Magano & Mendes, 2021; Papp & Neumann, 2021; Varga et al., 2024). Since tutors and mentors are often regarded by Roma students as precedents to follow (Lafferthson et al., 2002; Varga et al., 2024), it is safe to believe that mentorship programmes could be one of the most effective ways to help Roma in higher education. There is already extensive evidence that these programmes can have a largely positive impact on Roma children at lower levels of education. Lafferthson and colleagues (2002) examine an initiative aimed at encouraging Roma children from primary schools to continue their studies in high school instead of vocational education—which makes it harder to get into higher education afterwards—or instead of not pursuing secondary studies at all. The project provided the students with teachers serving as mentors, who gave personal attention to their mentees, most of them on multiple occasions in a week. They found that students participating in the programme had much higher rates of educational continuity in high schools than the statistical average at the time. Teachers participating in the initiative pointed to the significance of the cultural differences of young Roma regarding their education. To support this, the study also found that mentors who have previously worked with Roma children—perhaps by being familiar with their socio-cultural situation—generally were more successful. Similarly, Papp and Neumann (2021), conducting statistical analysis on large-scale public data on Hungarian primary schools, have also found that teachers with Roma backgrounds significantly increase school resilience, a variable which they defined with the further educational success of students from Roma and socioeconomically disadvantaged backgrounds—which two factors

often happened to coincide. These findings might lead to the conclusion that Roma mentors could be of additionally significant help to their young peers. To summarise, we can establish that literature agrees on mentorship being a possible instrument in supporting Roma in higher education.

Although identity is the most abstract and largely intangible obstacle to pursuing higher education among Roma, it may be one of the most crucial ones. Roma students often find themselves temporarily alienated from their previous social groups, since they often geographically relocate, as well as pursue a different and often unconventional path in the eyes of their communities. (Durst et al., 2023). Studies on the matter reject the narrative of total meritocracy and point to the difficulties of searching for identity and the feeling of not belonging that comes with it as one of the most important disadvantages Roma face when pursuing higher education and social mobility. Other socially mobile Roma have also stated that it is unjust to make individuals responsible for their social mobility (Durst et al., 2023). Findings all point to the environment that individuals find themselves in during the course of their studies, and the identity it provides them as one of the most notable factors in pursuing education, especially with first-generation university students. Furthermore, connecting to other people from similar backgrounds and battling with similar difficulties can give Roma students a peer group to belong to, as well as provide them with the social capital necessary to successfully enter the new circles of society that they strive for (Varga et al., 2024). The impact of peer community is amplified by Magano and Mendes's (2021) finding regarding how, in lower levels of education, Roma students tend to drop out simultaneously. These findings point to how a close-knit and education-driven Roma student community could largely benefit their educational continuity. This is in line with what Durst and colleagues (2023) discovered regarding how socially mobile Roma do not seem to completely assimilate, but rather form their own middle-class Roma identity, based on their university peer community. However, community is not the only requisite factor in finding their new identity. Durst and colleagues (2023) state that Roma cultural capital heavily decreases the price of social mobility. Finally, literature suggests that a healthy identity is vital for Roma to successfully pursue higher education, and that learning about their culture and producing a community of students from similar backgrounds might be great tools in aiding the process of identity search.

Hypothesis

After identifying practices that could potentially help encourage higher educational studies among Roma, whilst also easing the burden on those currently studying, I attempt to answer the following question:

How do Roma students perceive the effectiveness of non-financial tools supporting them in higher education in Hungary, and can these methods approach financial aid in significance?

My research posits that, based on existing literature regarding Roma underrepresentation in education, the following three practices could come close in significance to monetary aid:

1. Providing professional opportunities, namely internships and ways to see how studies will transfer to the labour market,
2. Creating mentorship programs by allocating mentors (preferably from similar backgrounds to the students) to young Roma,
3. Supplying means to study their own culture, and producing an inclusive peer community of Roma students, to maintain a healthy self-identity.

To assess the validity of these propositions, I conducted both qualitative and quantitative research, further detailed in the *Methodology* section of the paper. I examined empirical data—which was yet to be collected with respect to the non-monetary tools of supporting Roma—in order to reveal whether the theorised tools of aid can actually live up to the conventional scholarship programmes in effectiveness.

Methodology

Conducted interviews

Based on Young's aforementioned principle (2000), I use qualitative methods and their results in context with statistical ones (see *Survey-based research*). Though it is important to mention that the primary source of evidence is the analysis of the surveys, the interviews complement and elaborate on them constructively.

To gather comprehensive and all-encompassing perspectives on the matters of the intersection of Roma identity and higher education, I interviewed the director of the UCCU Foundation, Szilvia Szénási, in her office. UCCU Foundation works with young Roma volunteers, mostly uni-

versity students, to create anti-stigmatisation educational programmes for children of the majority society as well as to help the formation of a healthy identity for the Roma students themselves. She discussed how she perceives Roma's experience and challenges in higher education, with special focus on how community and identity shape these. Based on the literature reviewed and reinforced by the interview, I have found that the way young Roma university students live their identity heavily influences their continuity and success in education (Durst et al., 2023).

Furthermore, I interviewed two current Roma university students on their experiences in two separate phone calls, providing a detailed insight into their struggles and needs, which I could later contextualise with quantitative methods. They were given the same set of questions (shown in the survey appendix) with an opportunity to further elaborate on each point.

Lastly, I had a discussion with Lajos Lócsei, a Roma parliamentary representative, where, though the main focus was on general Roma underrepresentation, a large portion of the discussion was dedicated to education and its associated difficulties, also touching upon his own personal experience.

All of the interviews were held in 2025, between January and March, and they were all conducted in Hungarian; therefore, all quotations are translated. The interviews were not recorded, and written consent was obtained afterwards, both for the wording of the quotes and their context in the text.

Survey-based research

The second approach to procuring evidence was to contact various institutions, employing some of the hypothesised aiding methods with Roma university students, to request that they forward surveys to their members aimed at assessing the effectiveness of their methods.

The main basis of surveying was the 'Parochial Roma Colleges' (*Keresztény Roma Szakkollégium*) network. This includes five university colleges specifically set up for Roma in five different major Hungarian cities by five separate religious organisations. All of these institutions provide an integrated and close-knit community for their students. They are residential colleges providing scholarships, mentoring programmes, and mostly obligatory extracurricular courses on the topics of religion, Roma culture, and society. Many of the institutions provide professional help and internships as well (Evangélikus Roma Szakkollégium, n.d.; JRSZ:

Jezsuita Roma Kollégium és Szakkollégium, n.d.; Miskolci Görögkatolikus Roma Szakkollégium, 2024; Szakkollégiumi program, n.d.; Szakkollégium, n.d.).

The survey was completely anonymous, and the results were stored in a password-locked account, entirely separate from the institutions themselves. The forms were sent out by the colleges and were filled out online with the answers directly arriving in the locked account, or via direct phone calls concerning a few respondents who are not members of the parochial colleges. I gathered responses from current and past students alike with slightly separate questionnaires, only including relevant inquiries for the target groups. The study collected a smaller sample size of 26 responses, so conclusions must be taken into account with care. To view the whole survey, please consult the Appendix.

Table 1 *Respondents by institution*

Name of Institution	Current students	Alumni
Roma Versitas	1	0
Not part of any of the organisation	1	0
Jezsuita Roma Szakkollégium	4	2
Evangélikus Roma Szakkollégium	7	7
Szegedi Keresztény Roma Szakkollégium	4	0

Following data collection, the survey results were analysed by importing them into a shared database, from which relevant means and percentages were subsequently calculated. In cases where participants had to rank different methods by usefulness, multiple items were often ranked as valued equally in the surveys, where they could not decide which was more significant. Therefore, the scores attributed to different supporting methods (as seen in Figure 3) were calculated by the number of different methods ranked lower by respondents, because this gives a more representative picture of their comparative effectiveness.

Results

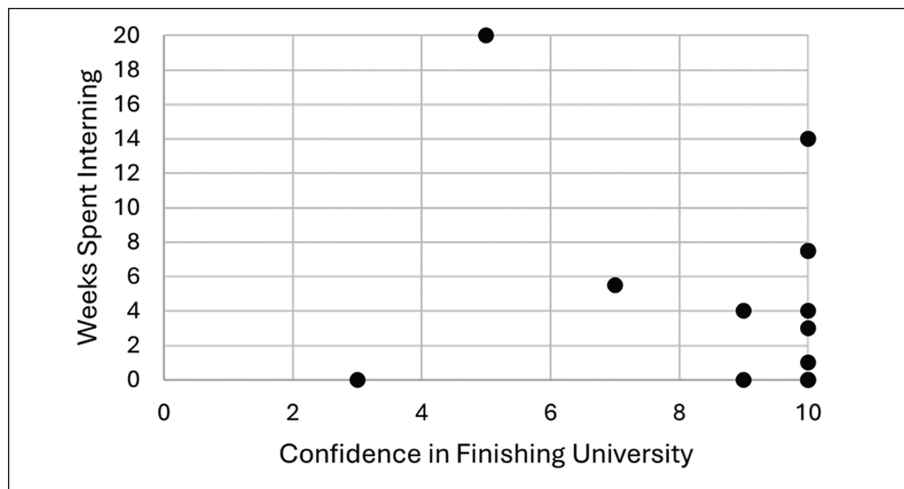
In this section, the study's theoretical findings and hypotheses were put to the empirical test, assessing their validity with respect to Hungary by examining the collected survey data and complementing it with evidence collected from the interviews.

The professional aspects of studying and internships

In the following section, I explore whether my first hypothesis stands—namely, whether internships are crucial to Roma higher education students in helping them see how their studies transfer onto the labour market. Previous literature on the topic suggests that, based on theoretical findings, internships tied to studies could prove to be crucial in Roma educational continuity.

However, my preliminary evidence suggests inconsistency between the existing theoretical and empirical results, since none of the interviewees mentioned internships when asked to think about non-monetary tools to ease higher education for their communities. Similarly, the survey data examined also mostly disproves the hypothesis. Participants currently studying in higher education were asked to indicate the approximate time period they spent interning, if any, and also how confident they were concerning graduating university, serving as a main success indicator in this study. As

Figure 2 *Duration of internship and confidence in finishing university*

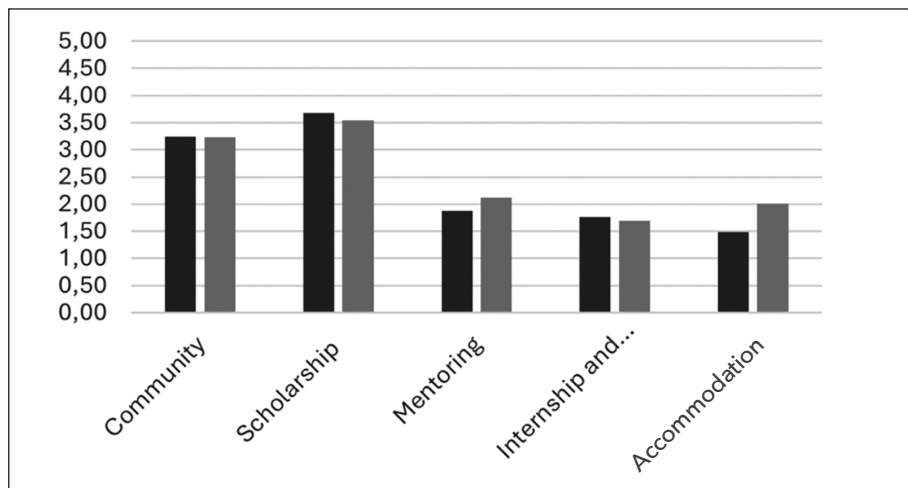


displayed in Figure 2, the two variables did not display a strong connection. In fact, the student who spent the most time interning ended up being the second-least sure to successfully finish his studies, while many students were quite sure about doing so without any former internship experience whatsoever.

Furthermore, everybody partaking in the survey was asked to rank how much they thought different resources (Roma peer community, scholarship, mentoring, internship alongside professional help, and accommodation) would assist them in pursuing their education before joining an organisation for Roma in higher education, and how much of use they ended up being after joining. By analysing this data—as shown in Figure 3—it is found that before joining the various organisations, internships and other professional help were found the least important by the participants, and there is only a slight increase in retrospect as well, since the significance of accommodation sharply fell among the surveyed, so that it ended up being the second-least important aspect of the five options after joining the organisations. This suggests that although the professional support may help the surveyed group, it is much less crucial than other non-financial and financial methods.

Figure 3 shows a graph of five resources ranked by participants before joining (N=26) and after joining (N=25) an organisation that provided

Figure 3 Importance of different forms of aid after/before joining organisations that provide it



them. I attributed a score of 5 to any resource ranked first, 4 to the second, and so on. If a resource was not even listed as being helpful, a score of 0 was attributed. The graph shows conventional financial aid as being the most crucial, with community coming as close second. Internships, though they may be useful and reassuring, were not viewed as vital for successful higher educational studies by the respondents. Further empirical examination would be needed to assess, however, whether it aids the socially mobile Roma's original community to better accept the path they choose to take.

The need for role models and mentorship

Among the literature of the ever-so-debated topic of aiding Roma students, previous academic researchers settled on the theorised significance and potential of mentorship close to unanimously. The surveyed importance of mentorship—shown in Figure 3 above—among the participants, however, shows a slight contrast to these claims. Mentoring is heavily lagging behind traditional monetary support as well as community, whilst also showing higher initial expectations regarding its usefulness, exhibiting the second-largest negative difference in value before and after joining higher education.

Examining the hypothesised connection between the ethnicity of the mentors and their perceived importance, however, leads to an interesting revelation. We initially find, as shown in Figure 4, that students who deemed their mentor as being Roma ended up perceiving their mentor as a similarly significant aiding method as those who reported having a non-Roma mentor. However, when analysing the respondents who did not wish to answer about their mentors' ethnicity, we can find that they ranked mentorship at least twice as high as the other two groups. This might suggest that those who built a stronger connection with their mentor felt that this information was too personal and that they had no right to disclose it. This tendency is also supported by the fact that, as Figure 5 indicates, the highest percentage who discussed family issues—which was shown as a highly confidential topic in previous studies (Lafferthon et al., 2002)—was found amongst those who did not wish to disclose the ethnic identity of their mentor.

However, it is important to note that the deviation between Roma and

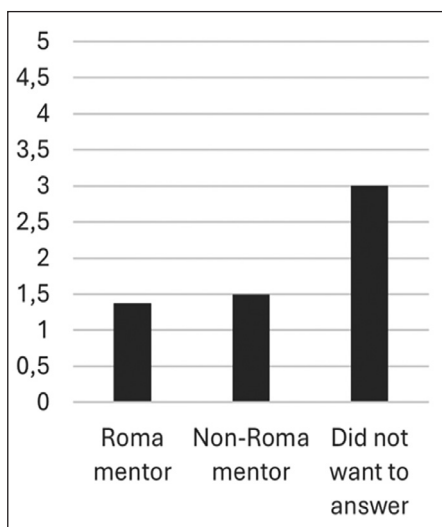


Figure 4 *Mentors' ethnicity and its perceived importance*

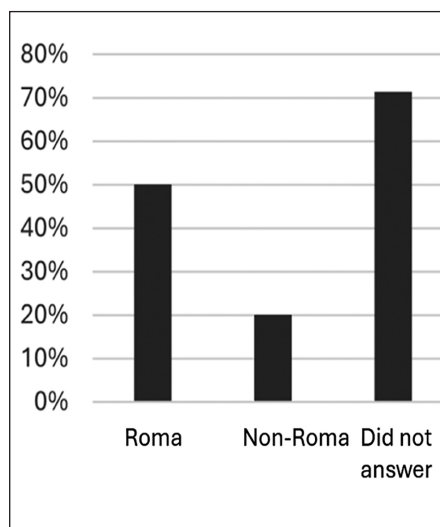


Figure 5 *Percentage who discussed family situation with their mentor*

non-Roma mentors, in this case, was much more significant than with usefulness, showing that mentees trust their Roma mentors on the issue of family more frequently. Though the confidentiality between successful mentors and their mentees is an intriguing revelation, it makes it challenging to state whether there is a definite connection between a mentor's success and their cultural background. Eventually, the survey-based research does not firmly support previous theoretical research on the matter.

The deviation between the results found by the survey, conducted among university students, and the mentorship programme, among children attending primary school surveyed by Lafferthson et al. (2002), might be best explained by one of the young university students I interviewed, who took part in a mentorship programme during her high-school years. She expressed that "even though previous mentorship helped me greatly, now, studying at university, I enjoy the personal freedom that I have and seek help mostly in professional regards."

Figures 4 and 5 (above) show that mentees did not wish to disclose the identity of their mentors they deemed most useful and trusted with the most confidential topics. The perceived usefulness does not show much deviation between non-Roma and Roma mentors. However, Roma mentors are more frequently trusted with family issues.

In essence, mentorships seem to be perceived as important non-financial tools for Roma students, not only in providing them with professional tutors but also someone to discuss difficult life matters and establish personal connections with, however, they appear to fail to make as significant an impact according to respondents as conventional financial aid does.

The search for identity and the role of culture and community

As previously examined, literature on the topic argues for the significance of identity in educational continuity. Researchers point to a Roma student community and learning about their culture as theoretically successful methods to decrease the burden on Roma pursuing university studies.

This finding is supported by my interview with Lajos Lőcsei (2025), where he stated that a crucial reason for him being able to acquire higher education and thus his further successes is that he “was simply lucky”, and had “good, supportive teachers and parents” along the way, emphasising the role of the social environment in forming Roma educational pathways.

Therefore, it is recommended to delve further into the challenges related to self-definition and community in an attempt to discover tools that could make it less burdensome for socially mobile Roma. Szilvia Szénási (2025) mentioned that first-generation university student Roma, along the course of their mobility, at one point find themselves in a state of “middle-ground”, as she referred to it. “In this state, they are already disconnected from their original community and not yet connected to their new one.” They feel like they don’t belong to any community, neither the minority nor the majority. They find themselves rejected by both and thus cannot belong to any. In this crucial stage of the process of mobility, she deems that “a Roma peer community is what can help the most”. She also mentions that such a community can aid them in discovering a stronger identity by giving them people to discuss it with (Szénási, 2025). As Szénási (2025) also mentioned, “these individuals, after exiting the state of ‘middle-ground’ tend to find their way back to belonging to their original community as well”, regardless of the new social circles they entered, eventually finding a way to belong to both with their dual identity. However, connecting with young mobile Roma in similar circumstances is vital to help them bear the burden of the solitude of the “middle-ground” as well as to succeed in forming their strengthened identity (Szénási, 2025).

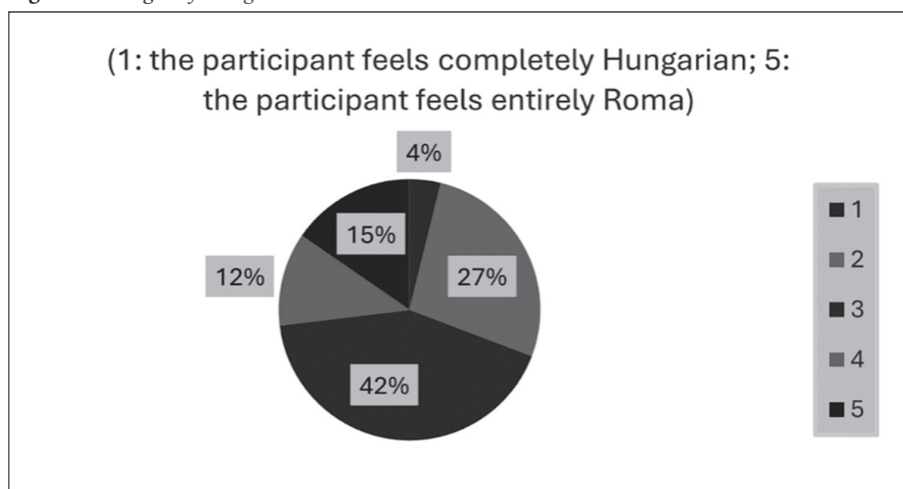
Moreover, studying Roma culture and history to help form a healthy identity must not be disregarded either. The connection might not be evident at first. However, Szénási (2025) shed light on how familiarising themselves with Roma culture and history is key to being able to define their identity. By getting to know what background they come from, they can choose which aspects—for example, traditions—to keep and what to change.

The importance of community is also supported by the empirical findings of my survey. It is, by and large, the most significant non-financial aspect of support for young Roma before joining organisations that support Roma studying in higher education (community had a score of 3.2, whereas mentoring and internship had 2.1 and 1.7, respectively, see Figure 3), and it remains steady, living up to its expected saliency. It also competes in prominence with the long-established tradition of resolving the issue through financial aid. The survey-based statistic also finds community strongly linked with the perseverance of Roma identity; in fact, most participants from non-Roma backgrounds also gained a heightened sense of Roma identity (4 out of 5), with only one person surveyed signalling that they felt solely belonging to the ‘Hungarian’ community. Most of the surveyed—especially those coming from Roma backgrounds—answered with ‘3,’ meaning a similar strength of belonging to both groups, displaying the dual identity that most Roma colleges strive for.

The empirical data also supports previous findings that studying Roma culture and history truly strengthens Roma identity. In most Roma colleges, students must attend extracurricular workshops on the topics of Romology, i.e. Roma culture, religion, and society. The survey-based data finds that those who enjoy attending workshops on Roma culture the most out of the three, on average, have a stronger Roma identity, 3.58, than the general average, 3.08. However, it must be noted that causation might be reversed, and it may be that those with the strongest sense of Roma identity are the ones who enjoy studying their culture in workshops. Thus, we can deduce only that there is a connection, and further examination would be required to map the direction of the causation or whether there is any at all.

Figure 6 shows how strongly respondents felt about belonging to the Roma or Hungarian community. The most typical answer was 3, suggest-

Figure 6 *Strength of Hungarian and Roma identities*



ing a balanced dual identity, whilst only one person felt exclusively belonging to the Hungarian community. The second most typical answer was 2, whereas a completely Roma identity came third.

All in all, it can be concluded that community and culture as tools of support were not only seen by qualitative methods to be helpful in the face of the complexities posed by the search for identity, but also deemed effective by statistics-based quantitative methods. This demonstrates that the experiences reported by the interviewees could also be generalised, supporting the theoretical findings of academic literature. Through all this, peer community proved not to fall behind the tradition of scholarships in helping young Roma achieve their goals in higher education, suggesting the need for providing such a peer community to the Roma youth alongside subsidies.

Limitations of the study

An important note regarding the perceived importance of internships and professional help is that it should not be taken as a definitive indicator of its actual effectiveness as a support tool, since the majority of respondents are too early in their studies to be able to clearly assess its impact, and some have not even been offered such opportunities in their particular programmes. Moreover, professional help goes beyond internships and

might manifest in the development of other soft skills that help transfer educational experience to the labour market, such as IT skills and language learning, the latter being frequently featured in such programmes. To evaluate how students value these, further study is required.

The connection between mentors' ethnicity and their perceived impact is also subject to limitations due to the exclusionary option in the survey. Hence, here too, additional examination is needed.

Furthermore, certain aspects of non-financial tools of support for Roma in higher education were not in the scope of this research, such as religious studies and accommodation (ranked as the least crucial support after joining higher education, see in Figure 3), and the condition of housing. There was insufficient information to make further deductions regarding their significance to students. Thus, further inquiry is advised regarding these factors.

Conclusion

As the heavily fragmented academic literature and the enduring prevalence of the issue of Roma underrepresentation in higher education predicted, there is no method that Roma students in higher education evidently view as being the most helpful. While financial aid proves to remain highly valued, the non-financial initiatives vary in their perceived importance and my findings at times contradict the theoretical expectations of the reviewed literature.

Firstly, in my study, internships appeared to completely fall short of expectations posed by academic sources. They ended up bearing little significance to the interviewed and surveyed Roma students, and I also failed to find any connection between the time spent in internships and the participants' confidence in completing their studies. The interviewees also did not appear to attribute too much usefulness to gaining professional experience.

Secondly, mentorships, despite the apparent academic consensus on their significance, performed worse in perceived significance compared to conventional financial aid, according to the gathered empirical data. Nonetheless, even if less vitally than anticipated, they still benefitted the students personally. The survey also revealed that the level and the strength of the mentees' relationships with their mentors might be affected by the mentors' ethnicity; however, further and more elaborate research is needed to prove the correlation.

Lastly, studying their own culture and history partly lived up to the academic expectations, guiding students in their treacherous and unknown new social environment, helping them in their search for identity by introducing them to their past to find their present and future. Moreover, another tool that helped build a balanced identity, and which showed persistence throughout theory and empirical examination in its significance to Roma students, was the peer community, which was nearly equal in importance to financial aid. Not only did it strengthen their Roma identity, but it also bestowed upon them the ability to navigate the various obstacles of higher education, securing the much-needed social capital for its members along the way. In spite of all that, what may have been the most important impact of these Roma communities is that in this alien, uncharted territory, they were capable of providing what students needed the most: a family with a place to call home. The significance of the community that Roma students found amongst their peers stands as an enduring statement about the urgent demand for a larger focus directed at more composite approaches, including the efforts to create Roma youth communities, a prerequisite for finding solutions to the ever-so-complex problem of providing sufficient support for Hungarian Roma in higher education.

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Appendix

Survey

Please note that the original survey was conducted in Hungarian. Below, you can find a translated version of the questions, excluding the consent section. Please also note that the questions may have slightly differed from the ones listed below, based on the individual colleges and institutes the surveys were sent out to.

Section 1: Personal inquiry

- *What age are you?*
- *What is your sex?*
 - ☐ Male
 - ☐ Female
 - ☐ I would not like to answer
 - ☐ Other

- *Do you view yourself as of Roma origin?*
 - ☐ Yes
 - ☐ No
- *What is the highest level of schooling your father has received?*
 - ☐ Less than eight grades of elementary school
 - ☐ Eight grades of elementary school
 - ☐ Vocational middle school
 - ☐ High school
 - ☐ University/ College
- *What is the highest level of schooling your mother has received?*
 - ☐ Less than eight grades of elementary school
 - ☐ Eight grades of elementary school
 - ☐ Vocational middle school
 - ☐ High school
 - ☐ University/ College
- *How many semesters do you have left at university? (Question only asked to current students)*

☐ 1	☐ 6
☐ 2	☐ 7
☐ 3	☐ 8
☐ 4	☐ 9
☐ 5	☐ 10 or more
- *How many semesters have you already completed at university? (Question only asked to current students)*

☐ 1	☐ 6
☐ 2	☐ 7
☐ 3	☐ 8
☐ 4	☐ 9
☐ 5	☐ 10 or more
- *How sure are you on a scale of 1 through 10 that you are going to finish your university studies? (Question only asked to current students)*

☐ 1: I am completely sure I will not	☐ 6
☐ 2	☐ 7
☐ 3	☐ 8
☐ 4	☐ 9
☐ 5	☐ 10: I am completely sure I will
- *What level of university degree have you already completed? (Question only asked to alumni)*
 - ☐ I dropped out
 - ☐ I am still studying
 - ☐ Bachelor's
 - ☐ Master's
 - ☐ Doctorate/PhD

• *If you had to choose, to which community do you identify more closely with? (3 on the scale signifies identifying with both groups with the same intensity)*

- ☐ 1: I view myself as completely Hungarian
- ☐ 2
- ☐ 3
- ☐ 4
- ☐ 5: I view myself as completely Roma

• *How many people, including teachers, tutors, and students, could you count on in the face of hardship from the institute? (Institute referring to the parochial colleges or Roma Versitas respectively) (Question only asked to current students)*

- | | |
|-----------------------------|-----------------------------|
| ☐ 0 | ☐ 15-20 |
| ☐ 1-2 | ☐ 20-25 |
| ☐ 3-5 | ☐ 25-30 |
| ☐ 6-9 | ☐ 30+ |
| ☐ 10-15 | ☐ |

• *Please arrange the following aspects based on their significance to you in life. (1: most important, 5: least important)*

- ☐ Family
- ☐ Friends and other communities
- ☐ Money
- ☐ Religion
- ☐ Professional/ academic success

Section 2: Inquiry about the institute's methods

• *How often do/did you talk with your mentor?*

- | | |
|---|---|
| ☐ Multiple times a week | ☐ Monthly |
| ☐ Weekly | ☐ 2-3 times a month |
| ☐ Every 2-3 months | ☐ Only a few times a year |

• *From the topics listed below, which did you discuss?*

- | | |
|---|--|
| ☐ Studies | ☐ Future planning, professional interest |
| ☐ Academic matters not closely related to studies | ☐ Friends/social situations and difficulties |
| ☐ Lifestyle (i.e., time management) | ☐ Personal state of mind |
| ☐ Friends/social situations and difficulties | ☐ Family matters |
| | ☐ Other |

• *Which of the following do you think your mentor identifies as?*

- ☐ Roma
- ☐ Hungarian
- ☐ I do not wish to answer
- ☐ Other

• *How many weeks of internships did you have over the course of university?*

- | | |
|--|-----------------------------|
| ☐ None at all | ☐ 5–6 |
| ☐ Less than 1 week | ☐ 7–8 |
| ☐ 1 | ☐ 9–12 |
| ☐ 2 | ☐ 12–16 |
| ☐ 3 | ☐ 16–20 |
| ☐ 4 | ☐ 20+ |

• *Which of the following workshops did you like to attend the most?*

- ☐ Religion
- ☐ Culture
- ☐ Society

• *Please put the factors in order of their importance to you when applying to the institution. (1: Most important, 5: Least important)*

- ☐ Scholarship
- ☐ Community
- ☐ Mentoring
- ☐ Internships and aid in professional development
- ☐ Accommodation

• *Please put the factors in order of their importance to you after being a member of the institute (1: Most important, 5: Least important)*

- ☐ Scholarship
- ☐ Community
- ☐ Mentoring
- ☐ Internships and aid in professional development
- ☐ Accommodation

XIN DAI

Strategic Factors Influencing BYD's Decision to Invest in Hungary as a Gateway to the EU Market

Abstract

This article explores why Chinese electric vehicle manufacturer BYD (Biya-di Co., Limited) chose Hungary as its gateway to the EU market. It examines key factors such as Hungary's investment-friendly economic policies, political alignment with China, and logistical advantages linked to its central location and EU transport networks. The analysis includes a case comparison with CATL (Contemporary Amperex Technology Co., Limited), another Chinese firm that faced difficulties in Germany and Hungary. In addition to these advantages, the article also examines potential regulatory and geopolitical risks. Overall, Hungary's unique combination of economic and geopolitical conditions offers insight into China's expanding investment strategies in Europe.

Introduction

In recent years, many Chinese companies have expanded into Central and Eastern Europe (CEE), viewing the region as a strategic entry point into the European Union's market. Among them, Build Your Dreams (BYD), a global leader in electric vehicles (EVs) and in battery technology, stands out. BYD's choice of Hungary as its European gateway reflects a combination of economic,

political, and geographical factors, which this article aims to explore in depth.

While Chinese–European trade relations shape the broader context, this article focuses on why Hungary, specifically, became BYD’s destination over other European markets. Understanding this decision sheds light on Hungary’s economic positioning, investment policies, and evolving relationship with China and the wider CEE region. Beyond the business rationale, this case shows how semi-peripheral EU member states like Hungary navigate between global powers, challenging established models of economic sovereignty and regulatory alignment.

Alongside examining BYD’s expansion, this article compares its approach with that of another Chinese firm, Contemporary Amperex Technology Co., Limited (CATL), drawing lessons from CATL’s experiences in Germany and Hungary. This comparison helps identify differences in strategy and external conditions that shaped each company’s experience and highlights possible risks and regulatory challenges.

The analysis begins by considering Hungary’s political and economic ties with China, and BYD’s international strategy. This background sets the foundation for understanding how and why Hungary emerged as BYD’s preferred gateway into the EU market.

Therefore, the article explores three key questions:

1. How do political, economic, and logistical factors make Hungary attractive to Chinese EV firms like BYD?
2. How does BYD’s experience differ from other Chinese investors, particularly CATL?
3. What potential risks could affect BYD’s strategy in Hungary?

China’s political and economic ties with Central and Eastern Europe

Understanding the political and economic dynamics between China and Central-Eastern Europe (CEE) is essential to analysing BYD’s expansion into Hungary. China and Central-Eastern Europe’s relationship intensified following the 2008 global financial crisis (Jankowska, 2019). The 16+1 framework, launched in 2012 by China, aimed to strengthen China’s political and economic ties with 16 CEE countries through trade, investment and infrastructure projects (European Parliament, 2017). Despite initial enthusiasm for the initiative, concerns over trade imbalances, limited access to the Chinese market, intensifying regional competition, and delays caused by stricter EU reg-

ulatory scrutiny created hurdles for the Chinese infrastructure projects (European Parliament, 2018). These factors, together with growing geopolitical pressure from both the EU and the United States (China–CEE Institute, 2024) encouraged many CEE states to realign their policies with broader EU-centric strategies and distance themselves from Chinese initiatives (Kratz, Pavličević, Stanzel, & Szczudlik, 2016; China Briefing News, 2024).

By the late 2010s, countries such as the Czech Republic, Romania, and Slovakia had limited high-profile cooperation with Beijing, including the rejection of Huawei's involvement in 5G infrastructure. Hungary, however, remained an important exception (Horváth, 2020). Instead of shifting away, it continued to deepen its engagement with China across trade, infrastructure and political coordination (China–CEE Institute, 2024). This created a uniquely favourable environment for major Chinese investors like BYD.

Political and economic relationship between China and Hungary

The relationship between Hungary and China dates back to 1949 and the formation of the People's Republic of China (PRC), when Hungary became the first country to formally recognise the country, and diplomatic relations were established shortly after (Embassy of Hungary in Beijing, n.d.). By 2023, bilateral trade exceeded \$14 billion, a 73% increase since 2013, driven mainly by high-value machinery, electrical equipment, and advanced technology products (China Briefing News, 2024).

In 2010, Hungary launched the “Opening to the East” strategy. It was designed to reduce reliance on Western Europe by strengthening ties with non-Western powers, particularly China (Embassy of Hungary in Beijing, n.d.; Gizińska & Uznańska, 2024). This closely aligns with China's Belt and Road Initiative (BRI), a land-based infrastructure and trade initiative connecting Asia and Europe, which includes the China–Europe express railway that facilitates faster transport between the two regions (Chatham House, 2022). Hungary was the first European country to join it through a formal agreement (Reuters, 2015). Thus, the country's early commitment and continuous cooperation also expanded in transport and logistics, reinforcing Hungary's role as a logistics hub for Chinese goods (Szunomár, 2017).

Frequent high-level visits further strengthened the partnership (Szandelszky, 2024). For instance, during President Xi Jinping's May 2024 visit to Hungary, eighteen bilateral agreements were signed (Voice of America, 2024).

Unlike its neighbours, Hungary fostered a politically stable, business-friendly environment tailored to Chinese firms. In Hungary, the expansion triggered job creation, technology development, and stronger bilateral ties that the government saw to outweigh the geopolitical concerns that drove other CEE countries away (Siklós, 2023).

While the “Opening to the East” strategy was originally intended to diversify Hungary’s foreign relations and investment base, in practice it has led to growing reliance on Chinese financing and cooperation, especially in areas like EV production, infrastructure, and logistics. This could potentially lead to a so-called “one-way street” (Fehér, 2025). The Budapest–Belgrade railway under the BRI, largely financed by Chinese loans, has become a controversial case: EU observers have raised concerns about the project’s lack of transparency and whether it aligns with broader European interests (Schoen, 2023).

BYD’s internationalisation strategy and entry into Hungary

Build Your Dreams (BYD) Company Limited is a leading Chinese multinational corporation, founded in 1995. Beginning as a battery manufacturer, it later expanded into electric vehicle (EV) production, power battery technology, and new energy solutions. Today, BYD has grown into one of the world’s leading electric vehicle and rechargeable battery manufacturers (BYD, n.d.), strengthening the company’s global presence.

A core feature of BYD’s success is its vertically integrated business model, which includes in-house production of EV components (Mak, 2021). This production model reduces costs and supply chain risks, making BYD’s overseas expansion more feasible than for many competitors, particularly as the company seeks to expand into regulated markets such as the European Union.

A major driver of BYD’s growth is its expansion beyond the limitations of the Chinese market. While most production remains domestic, the company has established a growing international presence, with facilities or planned expansions in several regions, including Southeast and Central Asia (Rho Motion, n.d.).

Nonetheless, aiming to benefit from the EU’s rapid EV market growth, BYD’s expansion strategy uses Hungary as a launching point into the re-

gion. The BRI supported the move by enhancing trade links, infrastructure, and cross-border cooperation in participating countries (BYD, n.d.). Hungary's participation in the BRI provided policy incentives and trade facilitation that helped integrate BYD into the European supply chain. This approach has positioned BYD at the forefront of Europe's electric vehicle industry while further strengthening China–Hungary economic ties (Cao, Zhang & Antony, 2018). In addition, Hungary's central location, which ties it into European trade routes, reinforces its status as a practical base for serving EU markets (PwC, 2024).

In 2017, BYD opened its first European electric bus plant in Komárom, Hungary, marking its first fully owned facility in Europe (State Council of China, 2024). This investment helped establish Hungary as a bridge between China and the EU. In December 2023, BYD announced plans to build a new EV plant in Szeged, Hungary, which is expected to generate jobs and bring advanced automotive technology (State Council of China, 2024).

Economic and policy environment in Hungary

Hungary's favourable economic environment is a key factor in BYD's decision to establish operations there. It directly impacts profitability and long-term business success. The following sections outline the main economic factors that make Hungary an attractive business destination.

Hungary offers one of the EU's lowest corporate tax rates, approximately 9%, which significantly reduces operating costs (PwC, 2024). This is especially valuable for a company like BYD that invests heavily in research, development, and production. In addition, state-backed incentives such as subsidised land use and streamlined administrative procedures in special economic zones provide a cost-effective and investor-friendly environment (Shang & Choi, 2020). These fiscal measures reduce financial risk and enhance profitability through faster project approvals and lower overall tax burdens.

Hungary's policy framework also mitigates geopolitical risk, offering a stable platform for long-term industrial operations (Shang & Choi, 2020). Government support helps reduce uncertainties like regulatory changes or political shifts. This confidence is critical in international expansion, where stable relationships with host governments can lower the risk of disruptions.

Being one of the first major Chinese investors in Hungary gives BYD both advantages and challenges. Early entry provides first-mover benefits, influence on local policies, and market leadership. However, pioneering in a relatively untested environment can expose the company to regulatory scrutiny, local resistance, or unforeseen EU-level challenges (White, Shotter, & Espinoza, 2025). Nevertheless, Hungary's pro-investment stance and BYD's early presence ensure a strong position in a changing investment landscape.

The deepening of Sino-Hungarian relations fosters a predictable and secure investment environment. Since the launch of the BRI, Hungary has become increasingly attractive to Chinese firms. For BYD, this political alignment eases bureaucratic processes and reduces regulatory uncertainty. In contrast to other EU countries where scrutiny of Chinese investments is rising, Hungary's proactive approach provides BYD with a more stable foothold in Europe.

Cultural and educational ties between the two countries also strengthen mutual understanding. Initiatives such as the planned Fudan University campus in Budapest, despite domestic debate, signal long-term engagement. These efforts, along with the Chinese–Hungarian Bilingual School and events like the Spring Festival, help build public support for Chinese investments (Embassy of Hungary in Beijing, n.d.). For BYD, this softer integration eases social acceptance and reduces community-level resistance, creating a more welcoming environment for its operations.

Logistics, labour, and location advantages

Hungary serves as a European logistics hub with well-developed road and rail networks. Its position along the Danube River boosts EU–China trade under the BRI framework, enhancing goods transportation (European Commission, n.d.). The country benefits from the Trans-European Transport Network (TEN-T), reaching Hungary's major national and regional logistics centres, roads and rail corridors (Borkowski et al., 2013).

As part of the TEN-T, Hungary connects directly to European highways, rail lines, ports, and the Danube (European Commission, n.d.). This infrastructure enables seamless material flow from suppliers to factories and finished vehicles to consumers, minimising delays and improving resilience. The country has a well-connected network of highways, railroads, and airports that ensure efficient transportation of goods across the EU (European Commission, n.d.).

The Rhine–Danube Corridor, for instance, connects France, Germany, Austria, the Czech Republic, Slovakia, Hungary, Romania, and Bulgaria along the Main and Danube rivers to the Black Sea. This corridor enables smooth rail and inland waterway connections, allowing for fast, multimodal transport of goods like BYD vehicles (European Commission, n.d.). The Mediterranean Corridor, running from Spanish ports through France and Italy to Hungary, strengthens maritime access and expands distribution routes (European Commission, n.d.).

Hungary's cost-effective labour offers another significant advantage. In 2023, manufacturing labour costs in Hungary averaged €12.8 per hour, compared to the EU average of €31.8 (Statista, 2023). This is especially beneficial for labour-intensive industries like EV manufacturing (Jett, 2024). Lower costs improve efficiency, expand production capacity, and improve profit margins.

Yet, cost alone is not sufficient; labour quality and productivity also matter. BYD has addressed this by investing in local talent development through job creation and partnerships with institutions like the University of Szeged (MTI-Hungary, 2024). This strengthens its long-term competitiveness and ensures a trained workforce for advanced EV production.

Hungary's central location offers more than logistical convenience. Located at the centre of Europe, it gives BYD direct access to primary markets while reducing dependence on long-distance shipping. Budapest lies within a 1,000 km radius of over 250 million consumers, and as an EU member, Hungary provides tariff-free access to a 500+ million-person market. This proximity supports faster delivery, lowers costs, and improves responsiveness to market shifts in a highly regulated industry.

Additionally, Hungary's role in regional supply chains strengthens BYD's vertical integration strategy. Proximity to major European economies means that suppliers, partners, and customers are within reach, reducing reliance on external distributors, enabling greater supply chain efficiency. Though BYD produces many components in-house, it still relies on certain suppliers for specialised materials and parts. By establishing local operations, BYD can localise critical parts of its supply chain, enhancing efficiency, ensuring regulatory compliance, and mitigating potential import restrictions on EV components.

Beyond speed, Hungary's logistics network reduces long-term operational risks. A strong internal system lessens reliance on third-party freight, lowering vulnerability to disruption. In contrast, less-developed systems elsewhere could raise freight costs, cause customs delays, and undercut profitability. Hungary's integrated system supports both immediate and scalable distribution as EV demand rises.

Government incentives further boost these advantages. Tax reductions for manufacturing and logistics investments help ensure that BYD not only enters the EU efficiently but also builds a sustainable, cost-effective foundation for future growth.

Comparison with CATL's Experience

By examining the expansion of another major Chinese firm, CATL (Contemporary Amperex Technology Co., Limited), we can understand what BYD learned and did differently. CATL is a leading Chinese battery manufacturer specialising in lithium-ion batteries for electric vehicles and energy storage. In 2022, it announced a €7.34 billion investment in a 100 GWh battery plant in Debrecen, Hungary, marking its second European facility after Germany (Contemporary Amperex Technology Co., Limited, n.d.).

CATL's challenges in Germany

Initially, Germany seemed ideal for CATL, given its world-renowned automotive industry and skilled labour force. However, CATL encountered multiple barriers: high energy prices (Eurostat, n.d.), high labour costs averaging €39.5/hour compared to Hungary's €12.8/hour in 2023 (Statista, 2023), and costly land and intense competition from EU-backed companies like (Volkswagen- and BMW-supported) Northvolt (Hetzner, 2021) and (Stellantis-, TotalEnergies-, and Mercedes-Benz-supported) ACC (TotalEnergies, n.d.), both with strong supply chains and priority contracts with local car manufacturers.

These structural challenges slowed expansion and raised operational costs, reducing the appeal of Germany for further large-scale investment.

CATL's challenges in Hungary (Debrecen)

Hungary offered lower costs, simpler regulations, strong transport links, and minimal initial competition. But even here, CATL faced major hurdles. In Debrecen, the project sparked public protests over pollution and water use, which triggered legal challenges and reputational damage (Business & Human Rights Resource Centre, n.d.). A January-February 2023 survey showed 64% of residents opposed the plant and expressed the desire for a referendum (Wu, 2024). In response, Hungarian authorities tightened environmental review standards (City of Debrecen, n.d.).

CATL eventually installed advanced wastewater treatment and recycling systems, but the delay of the plan raised attention to the risks of limited community engagement (Cheng, 2023).

BYD's response to CATL's challenges in Europe

Rather than replicate CATL's approach, BYD adopted a more cautious and adaptive strategy. CATL's challenges made Germany a financially and regulatorily less attractive destination, thus, BYD prioritised Hungary as a more practical alternative. While Hungary also posed challenges, they were seen as more manageable. Lower costs, investment incentives, and faster regulatory approvals in Hungary aligned better with BYD's strategy.

Two strategic differences helped BYD succeed. First, its vertically integrated business model, unlike CATL's supplier-dependent approach, gave it better cost control and production stability. Second, BYD took steps to engage early with the local community in Szeged, a city known for openness to foreign investment, holding discussions with residents and officials to address environmental concerns (Hungary Today, n.d.).

This early engagement built trust and created a welcoming environment, helping BYD avoid the backlash CATL faced, positioning it for smoother entry and expansion.

Local and environmental challenges facing the Szeged Project

While BYD's early engagement helped it avoid similar backlash seen in CATL's Debrecen expansion, the Szeged project has still faced a different set of local and environmental concerns as the plant moved forward. Many of these are typical of large-scale industrial developments with locals be-

ginning to express both hope and worry. These concerns mainly relate to local reactions and to environmental or logistical pressures triggered by the project.

Mixed local reception and communication challenges

The project's promise of 8,000–10,000 new jobs and major regional growth attracted residents yet concerns quickly emerged, especially over land expropriations and fears about incoming foreign workers. For instance, some of the land used to be dairy farms, and the city bought it for well below market value. The former owners took legal action arguing for fairer compensation (Kunstár, 2025).

Meanwhile, the satirical opposition party Magyar Kétfarkú Kutya Párt (MKKP) pointed out that unclear communication from city leaders allowed conspiracy theories to spread, including rumours that “cheap Eastern workers” would push locals out of their jobs. In reality, officials had already clarified that these workers would be housed on-site, outside of Szeged, but by then the fears had already taken hold. (Delmagyar.hu, 2025)

Environmental and logistical concerns complicate enthusiasm

Furthermore, as construction progresses, attention has also turned to the project's environmental demands and whether Szeged's infrastructure can absorb the added pressure. The factory is expected to use around 1.8 million cubic metres of water and over 280 million kilowatt-hours of electricity each year which is roughly equivalent to the consumption of a mid-sized city (Segesvári, 2025). In parallel, the site is expanding beyond initial plans, including a 10-hectare assembly hall, raising further questions about how local logistics systems will cope (Juhász, 2024). Around four million tonnes of construction material are expected to arrive over the next three years, most of it by rail, but experts have pointed out that without upgrades to the national network, the volume could overwhelm existing capacity (Molnár, 2024). These developments have led to discussion about whether the city's current infrastructure planning is keeping pace with the scale of the investment.

Potential challenges and mitigation strategies for BYD

While BYD's expansion into Hungary offers numerous advantages, it is not without risks. These extend beyond operations to broader uncertainties such as trade policies, regulatory changes, and geopolitical tensions. Recognising these challenges is essential to evaluating the sustainability of BYD's long-term strategy.

Regulatory scrutiny and EU alignment risks

One immediate concern is the growing scrutiny of Chinese state-linked investments within the EU (Gadocha, 2020). The planned BYD factory in Szeged, which has been widely promoted as a source of new jobs and innovation, is now under investigation by the European Commission. Authorities are examining whether the project received unfair subsidies from the Chinese state, which could lead to demands for repayment, limits on operations, or other corrective steps (White, Shotter & Espinoza, 2025). While the factory may deliver short-term economic benefits, the investigation points to a deeper tension: Hungary's growing reliance on Chinese state-backed firms is increasingly at odds with EU regulatory expectations. The European Union is growing more wary of member states allowing opaque foreign investments, especially in sectors like green technology (O'Carroll, 2024). By moving in this direction, Hungary risks distancing itself from shared EU-wide regulatory consistency and weakening its alignment with long-term European cohesion policies.

Regulatory and tariff challenges

Another significant external challenge is the imposition of additional import duties on Chinese EVs by the European Commission. As of October 2024, the European Commission enforced countervailing tariffs of 17% on BYD vehicles for five years. These measures aim to protect European manufacturers from unfair competition from lower-priced Chinese EV vehicles but pose substantial risks to Chinese firms if production remains in China (European Commission, 2024).

BYD has mitigated this by establishing local manufacturing in Hungary, avoiding these tariffs and ensuring compliance with EU standards (Reuters, 2024). However, this move may not fully shield the company from future regulatory shifts. If the EU introduces further tariffs, content requirements,

or compliance rules, BYD's production costs could rise substantially, narrowing its competitive margin (Szakács and Komuves, 2024).

Political and diplomatic risks

Hungary's close relationship with China has drawn criticism from other EU members concerned about political leverage and dependency. While Hungary's policy of "economic neutrality" and strong diplomatic ties with China have helped protect investments so far, future political changes could alter this balance.

For instance, while Viktor Orbán's government, in power since 2010, has created an investor-friendly climate, rising support for opposition figures like Péter Magyar indicates that policy changes could be on the horizon. A future administration might align more closely with EU standards by tightening labour or environmental regulations or revising subsidies for foreign investors. Magyar has suggested that unlocking frozen EU funds and implementing anti-corruption measures could lead to substantial policy recalibrations, potentially forcing BYD to renegotiate contracts or absorb additional costs (Komuves & Than, 2025).

Brexit provides a cautionary example. After leaving the EU in 2021, the UK experienced a 37% drop in foreign direct investment in the automotive sector. New customs checks and regulatory burdens disrupted operations and raised costs (NIESR, 2025). Similar effects could emerge in Hungary if EU relations shift, resulting in new trade barriers, labour policy changes, or supply chain delays.

Thus, while Viktor Orbán's government has consistently supported Chinese investment, BYD must prepare for possible policy reversals that could impact its operations and profitability.

Supply chain and technology integration

As BYD localises production, it faces challenges in integrating with European suppliers and transferring advanced technologies. While this transition can be difficult, BYD's vertical integration model gives it an edge by minimising dependence on external suppliers and maintaining control over quality and cost. Partnerships with local firms can also help smooth the process, allowing production systems to align with EU standards.

However, external shocks, like the Russia-Ukraine conflict, complicate

this further. Disrupted transport routes and rising energy prices have affected logistics across Eastern Europe. Hungary's industrial sector, in particular, has been impacted by gas supply instability and rerouted shipments (International Monetary Fund, n.d.).

If sanctions intensify or energy disruptions worsen, BYD may face higher sourcing costs, production delays, and thinner margins. Success will depend on BYD's ability to adapt quickly to changing circumstances while maintaining its competitive edge in the EU market.

Regional integration and local ecosystem gaps

Beyond supply chain adaptations and geopolitical pressures, the economic ramifications of BYD's presence run deeper. While the promise of 10,000 new jobs is substantial, BYD's Szeged investment raises deeper questions about its impact on Hungary's broader economy. Chinese EV investments in the V4, including Hungary, tend to focus on assembly with limited involvement of local producers, which means Hungarian small and medium-sized enterprises might miss out on supplier opportunities and know-how transfer (Szunomár, 2024). This could lead to a two-tier economy where foreign-owned giants thrive, and domestic firms are left behind. Although BYD is setting up a new development centre in Budapest, that alone is unlikely to fix regional imbalances. Technology and infrastructure often stay concentrated in the capital, widening the divide between urban centres and rural areas (Reuters, 2025). If local authorities fail to support supplier networks and promote balanced development, the boom in Szeged might bring jobs but also increase inequality and leave Hungary's industrial landscape more exposed.

Conclusions

This article set out to examine why BYD chose Hungary as its gateway to the EU market. The findings show that a combination of economic incentives, strategic location, political alignment and logistical advantages made Hungary a compelling choice for BYD.

Among these, Hungary's geographical location stands out as the most stable and long-term advantage, offering direct access to EU markets and streamlined distribution across the region. Its well-developed transport in-

infrastructure further enhances supply chain efficiency, which is essential in the competitive EV sector.

Hungary's pro-China political stance also plays a supportive role. Diplomatic ties, regulatory cooperation, and investment-friendly policies have helped create a stable environment for BYD. Additionally, economic incentives contribute to the country's appeal, but they are not unique. Other CEE countries offer similar benefits, and in some cases, even lower labour costs. Still, these advantages alone would not be sufficient without Hungary's operational strengths.

Ultimately, it is the interplay of location, infrastructure, political support, and economic incentives that has made Hungary BYD's optimal choice. While geography is the anchor, each element reinforces the others to create a uniquely favourable environment for investment.

That said, risks remain. Future changes in EU trade policy, shifts in Hungary's political leadership, or global supply chain disruptions could challenge BYD's position. However, such risks would likely exist in other European countries too. As it stands, Hungary remains BYD's most strategic entry point into the EU market.

Looking ahead, several areas deserve further exploration. The long-term impact of EU trade regulations on Chinese firms in Europe remains uncertain and requires ongoing attention. Evaluating local outcomes, such as job creation, environmental effects, and community sentiment, could shed light on the broader consequences of Chinese investments in Hungary. Lastly, understanding how Hungary's relationship with China may evolve under changing EU or domestic politics is key to assessing the future sustainability of this strategy.

In conclusion, BYD's investment in Hungary reflects how Chinese firms adapt their internationalisation strategies to balance opportunity with risk. BYD's decision to leverage Hungary's unique combination of economic, political, and logistical strengths shows a pragmatic and forward-looking approach. It has positioned itself not just to enter the EU market, but to thrive within it.

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ÁRON KRATOCHWILL

Radical Beginnings: The Legacy of Robert Owen in Early Childhood Education

Introduction

This paper reexamines Robert Owen's legacy in the history of early childhood education, arguing that his work in New Lanark predates that of later pioneers such as Friedrich Fröbel and Samuel Wilderspin. Although often marginalised in educational history, Owen opened the first known nursery school in 1816, formulating an educational vision rooted in humanist and utopian principles. Through a comparative analysis of Owen's writings and those of his successors, this study highlights the significant overlaps between Owen's theories and those of later educational reformers. The aim, however, is not to assert his direct influence but to explore the ways in which his views predate and resemble theirs, offering a more accurate account of the origins of foundational nursery school practices. Furthermore, it investigates the erasure of Owen's contributions, arguing that this omission stems not only from ideological discomfort with his radical social vision but also from a historiographical bias that favours conformity over originality. By restoring Owen's place in this educational lineage, the study underscores the lasting importance of utopian imagination in shaping both educational theory and practice.

Robert Owen, despite his groundbreaking efforts in establishing the first nursery school and articulating a comprehensive educational vision, has largely been excluded from the history of early childhood education. This

paper begins with that marginalisation, reassessing Owen's role not only in terms of chronology but also of conceptual innovation. Through a comparative analysis of pedagogical texts and an exploration of how educational standards are shaped, it contends that Owen's exclusion is not simply an oversight but an indication of deeper ideological tendencies: a preference for structured, professionalised narratives over radical, systemic alternatives that challenge the prevailing order.

Discussion

From No Place to Nursery School

The word utopia, coined by Thomas More in 1516, is a portmanteau made up of two Greek words, one meaning “not” or “no” and the other, “place”, literally translating to “no place”, a paradox More himself illustrated with the pun: “Is the good place (eutopia) by definition no place (utopia)?” (Goodwin, 2001, p.16). In other words, does the idealistic nature of utopia make it inherently unrealisable? This paradox became especially relevant in the 19th century when a group of reformers sought to apply utopian ideals to real-world change. Later labelled “utopian socialists” by Marx and Engels, figures like Henri Saint-Simon, Charles Fourier, and Robert Owen envisioned societies based on cooperation, education, and rational planning. Though Marx critiqued them for lacking scientific rigour in their theories, his classification was inconsistent, as these thinkers often diverged in both methods and theory, although most approached social reform from a humanist perspective, prioritising the fulfilment of human needs. They also sought legitimacy through natural and social sciences and frequently conducted small-scale experiments to demonstrate the feasibility of their ideas. In their pursuit of their utopian societies, a common issue they tried to tackle was the reformation of education, as all aforementioned figures saw it as vital to shaping a just, rational, and progressive society (Paden, 2002).

Robert Owen, in particular, stands out for his fundamental contributions in the field, as in 1816, he opened the first known nursery school as part of his New Lanark community in Scotland, earning him recognition by some as the originator of the infant school movement (Lambert, 2022). The concept of early education in a structured school setting gained prominence in the 18th century, as earlier thinkers, such as Plato, considered the

education of children under six to be premature and unnecessary. It was not until the 18th century that organised schooling for children under the age of six began to appear in Europe and the United States. The intellectual roots of this shift are often traced back to Enlightenment thinkers such as Locke and Rousseau, whose ideas on the malleability and natural development of a child challenged prior assumptions about early learning (Bruce, 2015). In continental Europe, educational reformers like Pestalozzi and Fröbel developed influential child-centred theories centred on play, morality, and sensory learning (JH Pestalozzi Society, 2024; Tovey, 2016). While the Pestalozzi Society understandably presents its founder in a highly favourable light, his ideas clearly influenced contemporaries such as Owen. In the British context, it was Samuel Wilderspin's infant schools which helped institutionalise early education, though often with a strong moral and disciplinary emphasis shaped by religious and class norms (Wilderspin, 1840). Within this historiographical tradition, Robert Owen occupies an ambiguous and often marginalised place. In Harry Morgan's *Early Childhood Education: History, Theory, and Practice* (2011), for instance, Owen is described only briefly, and largely as a mere follower of Pestalozzi. While this source is useful for understanding educational theory, it does not necessarily reflect the broader historiographical tradition, which would require examining multiple historical accounts of early childhood education. By contrast, there is a body of literature that does credit Owen, such as Caroline Winterer, who refers to him, though equally briefly, as one of the "chief intellectual architects of Britain's infant schools," highlighting the inconsistency in how Owen's role is acknowledged (Winterer, 1992; also Nutbrown & Clough, 2014). Despite these inconsistencies in how Owen is remembered, turning to the actual practice of his educational work at New Lanark reveals a far more pioneering and intentional approach than many later accounts suggest.

Owen opened the New Lanark Institution for the Formation of Character after taking over the management of the New Lanark Mills in 1800. As a successful businessman, he sought to improve the lives of the workers and their families in the mill community, motivated by deep concern over the poor living conditions, lack of education, and harsh treatment of children in industrial Britain. The school remained open until the 1880s, when the mill was sold and the building repurposed. During its operation, it served

at least 270 children and was staffed by around 14 teachers, though attendance figures varied. The children's ages ranged from eighteen months to six years, although Owen strongly advocated for keeping children in school until at least the age of twelve (Stott, 2016).

He believed that character is "formed for, and not by, the individual" (Bradburn, 1966, p.57), asserting that children's development depended primarily on the social and environmental conditions in which they were raised. Owen himself emphasised that a "man's character is made for, and not by, him" (Owen, 1813), highlighting that education should shape both moral and intellectual development in ways that benefit society as a whole. This belief underpinned his call for structures that nurture moral and intellectual growth for the collective good (Bradburn, 1966). While Owen's educational innovations were grounded in a humanist vision of development, they were inseparable from his broader critique of industrial capitalism as "he wanted to use education as an instrument for social change whereby a new form of socialist society would replace the existing competitive, class-structured one" (Whitbread, 2013, p.9). He condemned the dehumanising conditions of factory life, writing that "since the introduction of inanimate mechanism into British manufactories, man, with few exceptions, has been treated as a secondary and inferior machine" (Owen, 1829, p.9). As previously noted, Owen was a vocal opponent of child labour and a firm advocate for universal education. His advocacy began to take effect with legislation such as the Cotton Mills and Factories Act of 1819 and the Factory Act of 1833, which introduced stricter child labour laws. Furthermore, Owen maintained that social reform should be built upon a strong educational foundation, believing that lack of knowledge and inadequate moral guidance were the primary causes of poverty and inequality. His institution aimed to educate individuals in a supportive and intellectually stimulating environment, equipping them to contribute to a more just and cohesive society and eradicate the cruel injustices of the time. For this, as well as his religious views, Owen was heavily criticised. As *The Morning Post* wrote in 1836, he was "alternately venerated as an apostle, ridiculed as a quack, looked up to and followed as the founder of a new philosophy, condemned as a visionary enthusiast, [and] denounced as a revolutionary adventurer" (*The Morning Post*, 1836). This mix of praise and mockery shows how divided public opinion about Owen was. Unsurprisingly, the same newspa-

per, in its review of Owen's *The Book of the New Moral World* later that year, pushed this hostility further, characterising his proposals as “radical” and “destructive” and accusing him of seeking to “dissolve civilisation” (Griffin, 2021). Similarly, Owen's contemporary detractors frequently described him as “a knave, a charlatan and a speculative, scheming, mischievous individual” (Open University, n.d.). As this illustrates, Owen was a profoundly polarising figure, which has led some, including Frank Podmore, to speculate on the reasons behind his marginalisation. Firstly, his position as an “enlightened capitalist [...] heading the working-class movement” earned him few allies. Secondly, his outspoken views on religion—he denounced all of them and believed the “Church should be purged” (Podmore, 1906, p.118)—did not earn him many friends either. Another contributing factor lies in Owen's contested reputation in 19th-century, rapidly industrialising England, where economic growth heavily depended on an uneducated labour force, including children as young as five or six years of age (Podmore, 1906). Unsurprisingly, his efforts to keep children in school and provide them with a comprehensive skillset that could help them resist a system designed to exploit them were not welcomed by the dominant classes. Finally, Podmore highlights a more practical reason: Owen never published a formal, comprehensive work of his educational philosophy. The only detailed account was written by his son, Robert Dale Owen, but it remained largely undiscovered. As a result, Owen's educational legacy was left to gather dust in the margins of history, reducing his role to a footnote rather than a foundational figure in early childhood education (Podmore, 1906).

The History of Early Childhood Education and a Comparative Analysis of Key Pioneers in Infant Schooling

Understanding the issue at hand requires first situating it within its historical context. Many of the basic principles laid down by the early utopian socialists who tried to tackle complex issues in the field of education strongly echoed those of the Age of Enlightenment (Bista, 2024). One of the most prominent contributors to the field of education was the aforementioned Swiss educator Johann Heinrich Pestalozzi, commonly referred to as the father of modern education. The emphasis on “modern” is crucial, as the foundation Pestalozzi established in the late 18th century continues to be an influence in the field of education to this day and serves as an ideal that

reformists strive for (JH Pestalozzi Society, 2024). Owen recognised early the genius of Pestalozzi and even visited one of his institutes in Switzerland, after which, deeply impressed by his methods, he went so far as to bring some of the educators from the institute to New Lanark in 1826 to implement some of Pestalozzi's ideas in nursery school education, as Pestalozzi's focus was in primary education.

The aforementioned Friedrich Fröbel, a German educational pioneer who coined the term "Kindergarten" (literally: child garden) when he opened his first school for children in 1837, is one of the most well-known figures in the subject of early childhood education. Similarly, Samuel Wilderspin is another pioneer who opened his first infant school in 1824 in London, which sparked his long journey as an influential figure in the infant school movement. Fröbel based a crucial part of his philosophy around gardens, as indicated by the name of his preschool, since he believed outdoor play and engaging with nature were paramount to a child's development (Tovey, 2016). He viewed gardens not only as spaces for physical activity but also as environments where children could connect with the natural world, fostering both intellectual and emotional growth. For Fröbel, the garden represented a living classroom where children could experience the forces and laws of nature, observe growth, and connect to the earth (Tovey, 2016). Owen shared this belief and went as far as seeing the school's building as "a shelter from inclement weather" and implemented an open-air style nursery, an idea popularised around a century later by Margaret McMillan (Bradburn, 1966, p.59). He incorporated nature studies where children collected specimens from their environment and encouraged them to spend as much time as possible outdoors (Bradburn, 1966). Similarly, Wilderspin also valued outdoor education and emphasised the importance of physical activity in nature. He viewed the natural world as an essential part of a child's education, engaging the body and mind in ways that fostered growth and learning.

At the centre of Fröbel's, Owen's, and Wilderspin's theories lies the concept of play, coupled with a child-centred approach to teaching. Fröbel saw play as the key to self-expression and the highest form of learning, and Owen believed it should be the "chief occupation" of the children during the day (Bradburn, 1966, p.59). Wilderspin, too, placed great importance on play, recognising its role in fostering children's learning. All three emphasised the value of allowing children to lead their own learning through

unstructured play, where they could actively engage with their environment, make decisions, and develop independent thinking. This approach to education, rooted in the benefits of play, nurtured cognitive and emotional development and aligned with their broader vision of holistic child development, where the child's needs, interests, and capabilities were central to the learning process (Bradburn, 1966). The significance of play in a child's development was only fully recognised after their time, but today, a child's right to play is included in The Convention on the Rights of the Child by the United Nations (1989). And the list can go on and on, ranging from a focus on moral and character development, the teacher's role as a facilitator (Bradburn, 1966), to the emphasis on holistic education and parental involvement (Tovey, 2016).

Owen's Marginalisation

From this, it is difficult to deny the fundamental similarities between Owen's theories and those of later reformers, which raises the question: why do some accounts, such as the StateUniversity.com *Education Encyclopaedia*, describe Owen's school merely as a place "designed to provide children with a pleasant school environment where they could think about practical problems and experience little punishment" and one that "encouraged children to help each other, dance, sing, and play outside" (StateUniversity.com, n.d.)? While this is not an inaccurate description of the New Lanark infant school, it significantly oversimplifies Owen's educational experiment, reducing it to a benevolent refuge rather than recognising its radical innovations in early childhood education.

This discrepancy in historical representation is central to this paper's argument. While Owen's school is occasionally acknowledged, it is often overgeneralised and overshadowed by Owen's political radicalism. For instance, in canonical works such as Harry Morgan's *Early Childhood Education: History, Theory, and Practice*, Owen is mentioned only briefly, described as a mere disciple of Pestalozzi, with the New Lanark project reduced to a single sentence: "Owen also established a school for children under six in Lanark, Scotland" (Morgan, 2011, p.15). Meanwhile, organisations such as the British Association for Early Childhood Education do not mention Owen as an influential figure at all, while Fröbel and the aforementioned Margaret McMillan are prominently acknowledged.

So, how can it be that at the same time Owen is described by some as a peripheral figure, while others like Ophélie Siméon assert that “Owen [is] considered among education specialists to be the origin of both modern kindergartens and primary schools”? This paper believes that such conflicts reflect unreliable historiography and suggest a deeper concern with Owen’s utopian and systemic critiques. This discomfort has led to his selective inclusion or outright erasure from dominant educational narratives. However, this contradiction is not a new phenomenon. As early as 1871, Professor Thomas Henry Huxley, speaking at the centenary of Owen’s birth, recognised the foundational role Owen played in the development of early childhood education. Huxley declared: “No one can look into the problem of popular education but he must be led to Owen’s conclusion that the infant school is, so to speak, the key to the position. Robert Owen discerned this great fact, and with courage and patience worked out his theory into practice; and that is his great claim, if he had no other, to the enduring gratitude of mankind” (*The Nation*, 1902, p.131). This contemporary recognition further reinforces the idea that Owen’s marginalisation in modern educational historiography cannot be attributed to a lack of impact or relevance, but rather to shifting ideological currents and selective historical narratives.

Conclusions

Why Robert Owen Was Left Out of the Educational Canon

These reforms deepened tensions between industrial capitalists and social reformers. Yet Owen’s radicalism extended beyond labour policy; he directly criticised key educational figures of his time, including Andrew Bell, Joseph Lancaster, and James Whitebread (Podmore, 1906). Boyd’s *The History of Western Education* (1961) provides a clear example of how historiography has softened Owen’s radicalism. While calling him “the most outstanding figure” among early reformers, Boyd immediately frames Owen as having “adopted the methods of Bell and Lancaster,” whom he praises as “among the most important benefactors of the human race” (Boyd, 1961, pp.370–371). This portrayal downplays Owen’s originality and contradicts contemporary evidence, as Podmore (1906), Owen’s biographer, notes that Owen openly criticised Bell and Lancaster for their rigid, authoritarian

methods. By recasting a radical critic as a mere follower, Boyd turns Owen's challenge to educational orthodoxy into a mere extension of it, a move that helps explain why Owen's radical vision was gradually erased from mainstream educational histories. This paper suggests that such confrontational stances, combined with his utopian social vision, distanced him from both mainstream reformers and institutional recognition. However, while scholars have pointed to Owen's broader social critique as a key reason for his marginalisation, this paper deepens that argument by examining the case of Samuel Wilderspin. Living in the same period and sharing many of Owen's educational ideals, though not his wider utopian critique, Wilderspin's career offers a useful point of comparison for understanding how ideological alignment with dominant norms shaped historical narratives.

To strengthen this argument, it is important to consider alternative explanations for Owen's marginalisation. One possibility is that his writings were dispersed and difficult to access, with much of his educational philosophy recorded only in correspondence or the works of his son, Robert Dale Owen. While this certainly contributed to selective visibility, it does not fully account for the pattern of neglect: other contemporaries with similarly scattered writings, such as Wilderspin, received sustained recognition. Another potential factor is the geographic and linguistic bias in early educational historiography: German historians were more familiar with Continental theorists like Pestalozzi and Fröbel, which may have indirectly overshadowed Owen. However, even British historiography demonstrates a tendency to downplay Owen's significance, suggesting that his radical social vision and its challenge to prevailing capitalist and religious norms played a central role in his exclusion.

Wilderspin, who co-founded the Infant School Society with Owen in 1824, continued his work within established institutions after the society shut down under religious and political pressure (Wilderspin, 1840). Unlike Owen, who remained critical of industrial and social structures, Wilderspin adapted to dominant norms, gradually earning recognition and securing a place in the educational canon. This contrast illustrates that the success of educational reform depended not only on ideas themselves but also on the ability to navigate prevailing social and political structures.

Evidence for a broader historiographical trend comes from a survey of secondary sources. Morgan (2011) briefly mentions Owen as a follower

of Pestalozzi, reducing his New Lanark project to a single sentence, while Winterer (1992) acknowledges him as one of the “chief intellectual architects” of Britain’s infant schools but provides only a cursory discussion. Conversely, figures like Fröbel and McMillan receive far more extensive treatment across historiographies. This systematic minimisation supports the interpretation that Owen’s radicalism, rather than lack of impact or documentation, influenced the selective recording of his legacy.

The pattern of generalisation and the rare recognition Owen is given despite being years ahead of his peers has, as already mentioned, a complicated history. However, once examined more closely, the reasons for this marginalisation become clearer: it is far from an accidental oversight, but a function of how history is written to serve ideological comfort and institutional stability. This paper, therefore, concludes Owen’s exclusion not as a forgotten innovator, but as a figure whose utopian critique of capitalism and institutional power made him incompatible with the professionalised and conservative trajectory of early childhood education. Nevertheless, one should not have to be a specialist to recognise the foundational contributions of a key historical figure. Just as Edison and Tesla are known in discussions of electricity, or Darwin and Wallace in the theory of evolution, Owen’s name should be equally familiar when tracing the roots of modern kindergartens and primary education.

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