Financial Inclusion in the Metaverse: Exploring the Relationship between Education and Attitude towards Cryptocurrencies

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ABSTRACT,

The growing usage of cryptocurrencies in metaverse economies has raised concerns about their impact on financial inclusivity. This paper explores the relationship between education, attitude towards cryptocurrencies, and financial inclusion within this context. This is done through an online survey which includes 13 statements about cryptocurrencies (n=156). The results are analyzed using chi-square and Fisher exact tests to investigate a significant relationship between the variables. While previous research has indicated a clear correlation between education level and financial inclusion in India, China and South-America, this study fails to find significant evidence of a similar correlation for cryptocurrencies. There is no evidence to support a relationship between education level and cryptocurrency usage, and only 3 out of 13 statements show significance in the correlation between education level and attitudes towards cryptocurrencies. However, the study reveals broad concern regarding the risk of fraud and criminal activity associated with cryptocurrencies. These findings underscore the importance of implementing policies to address these risks effectively. The limitations of this study, including its geographic scope, small sample size, and digital character underscore the need for further research utilizing larger and more diverse samples to enhance generalizability and reduce potential response bias. Future researchers should consider these limitations while also incorporating other relevant elements and alternative frameworks to develop a comprehensive understanding of financial inclusion in the metaverse.

Keywords

cryptocurrencies, financial inclusion, digital divide, metaverse, education

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1. INTRODUCTION

The metaverse[1] refers to the concept of a multidimensional virtual realm where possibilities are near limitless. It spans various digital platforms, and seamlessly blends with the physical world, using technologies like virtual reality[2], augmented reality[3], blockchain[4], 5G data connectivity, and advanced virtual rendering applications (*Hackl*, 2021). Although many of these technologies have been around for a while, their combined use shows great promise. A recent study found that more than half of a sample of industry experts expect that the metaverse will become an integral part of our daily lives by 2040 *(Anderson et al., 2022)*. Industry giants such as Apple, Sony, Valve, and Meta have already displayed commercial interest by releasing functional virtual reality headsets, while popular games like Fortnite and Roblox showcase the potential of user-generated content within their interactive 3D worlds *(Dwivedi et al., 2022; Wilde, 2023)*. In these virtual economies, cryptocurrencies act as the primary medium of exchange *(Belk et al., 2022)*. Cryptocurrencies are digital tokens that utilize decentralized blockchain networks to verify ownership and facilitate transactions *(Čavalić et al., 2018)*. As such, they operate free from traditional intermediaries like banks and financial regulators *(Giudici et al., 2020)*.

As development of the metaverse continues, there is a growing concern regarding the emergence of new forms of inequality *(Massally et al., 2022)*. Among the extensively studied frameworks addressing inequality is the digital divide, which is defined as the exclusion of individuals from digital participation due to limited access and inadequate digital literacy *(Dijk, 2020)*. The digital exclusion discussed in this framework results in unequal outcomes, disadvantaging those who are unable to actively engage in the digital realm *(Kloza, 2023)*. While some believe that the digital divide is closing, a technological development carrying the magnitude and transformative potential of the metaverse certainly has the potential to re-ignite existing divides *(Deursen et al, n.d.)*. To avoid the metaverse becoming a breeding ground for increased inequality, it is necessary to carefully consider its effects on digital inclusion.

The metaverse offers a rare opportunity to change the dynamics of wealth and financial access (*Wheatley*, n.d.). To do so, it must offer an inclusive environment that supports equal participation. This study focuses on investigating the connection between education and attitudes towards cryptocurrencies, to determine whether (lack of proper) education poses a potential barrier to inclusivity within the metaverse. Allen et al. found that people with up to 8 years of education are about 12% less likely to own a bank account than their more educated peers using a sample of more than 140 nations *(Allen et al., 2016)*. Similarly, a positive correlation between education and financial inclusion is found in China, India and South-America *(Fungáčová & Weill, 2015; Ghosh & Vinod, 2017; Kazemikhasragh & Buoni Pineda, 2022)*.

Based on these previous findings, we hypothesize that education plays a role in determining how well people understand various aspects of digital currencies and how willing they are to use them. We aim to shed light on how people's opinions, adoption, and any obstacles they may experience in accessing and using cryptocurrencies within the metaverse are influenced by their educational background through a survey-backed analysis. Such information can be useful to guide the development of policies and strategies that promote greater inclusion and lower inequality within the evolving metaverse economies.

1.1 Research problem

"The metaverse can have a strong impact on sustainability and overall inclusivity if companies are mindful of the digital divide and accessibility" - (Balis, 2022).

A preliminary internet search already reveals the contrasting viewpoints regarding the impact of cryptocurrencies on financial equality. Undoubtedly, the metaverse as a whole proposes numerous potential qualities that contribute to reducing inequality. From a social perspective, the metaverse offers the opportunity for individuals to overcome physical barriers and connect with like-minded people in a virtual realm. Additionally, it provides educational and economic prospects for those who may face limitations in the physical world, such as children in poor or rural areas who have the ability access education in the metaverse, or creative individuals who can earn additional income by selling digital artwork *(Hurst et al., 2023; Lin et al., 2022)*.

However, the implementation of the metaverse comes with different areas of concern. One such concern is disparities in access to novel technologies. In an interview with STxCentral, IEEE[5] senior member Witkowski explains that creating these "islands of opportunities" - opportunities that are available to some, while others lack access or knowledge - comes with the risk of widening the digital divide, and stresses the importance of proper infrastructure development. If disadvantaged areas do not have access to the technology, they risk falling behind even more. "The problem that we have in the wireless industry is that we're perpetually inventing new things, and then expecting the public to accept them…" Witowski summarizes, stressing the need for equitable design principles *(Clift, 2022)*.

[1] Appendix A provides more information on the history and background of the Metaverse

[2] An immersive, multi-sensory experience in a three-dimensional digital environment *(Cipresso et al., 2018)*

[3] Technology that enhances the physical world by overlaying digital elements onto it *(Furht, 2006)*

[4] Blockchain is a decentralized network that is inherently immutable, transparent, and anonymous *(Ante, 2020)*

[5] *Institute of electrical and electronics engineers*, the world's largest professional association for engineering and technology

The inclusion of cryptocurrencies in the metaverse adds another layer of complexity to concerns of inequality. With blockchain technology being an essential component for many decentralized applications in the metaverse (DApps[6]), cryptocurrencies are likely to play a significant role in facilitating decentralized transactions *(Binance, 2023)*. As the metaverse becomes intertwined with virtual economies powered by cryptocurrencies, it is crucial to evaluate how this integration could impact the digital divide.

1.2 Research objective and question

The objective of this study is to investigate the relationship between education level and the individual's attitude towards cryptocurrencies, in order to better understand its implications on financial inclusivity in the metaverse. Prior research has consistently demonstrated a strong correlation between education and financial inclusion. Building upon this existing body of literature, the present study seeks to explore whether a similar correlation exists in the context of financial inclusion within the metaverse. Specifically, it aims to investigate the association between individuals' education levels and their perceptions and behaviors concerning cryptocurrencies. The resulting research question that guides this study is "To what extent does education level correlate with usage of and attitudes towards cryptocurrencies?".

1.3 Practical and academic relevance

This study adopts an exploratory approach to uncovering differences in attitudes towards cryptocurrencies among individuals with different education levels. According to a market analysis conducted by Precedence Research, the Metaverse is expected to grow from $68.5B in 2022 to $1.3T by 2030 *(Precedence, 2023)*. With large corporations investing in the technologies surrounding it, including cryptocurrencies, the findings in this paper can be used to better tailor those technologies to cater to a diverse range of users. Moreover, regulators can use the knowledge to implement more specific measures against potential inequality stemming from educational differences.

A search on SCOPUS[7] provided limited comparable research. While several studies investigated the potential of blockchain and cryptocurrencies on inclusivity, these all approached the topic from an accessibility point of view. Mohanty et al. studied the impact of blockchain interoperability[8] and concluded that it could lead to wider financial inclusion *(Mohanty et al., 2022)*. Kreitem and Regnedda investigated how distributed pool mining that is used to power cryptocurrencies and other blockchain applications could impact the digital divide. Their research studied 3 blockchain initiatives and concluded that the ability to take part as a node in a decentralized network helped bridge the digital divide *(Kreitem & Ragnedda, 2020)*. This paper aims to be one of the first to add to the topic of metaverse equality by taking a more human centered approach. By doing so, this study aims to provide new insights into the intersection of education, cryptocurrency usage, and attitudes towards cryptocurrencies.

1.4 Structure of the report

The subsequent section of this report, Section 2, delves into the theoretical background, providing an overview of the key concepts necessary to understand the research content. Following this, Section 3 describes the methodology, offering a detailed description of the survey design, sample collection procedures, and the statistical techniques employed for data analysis. Subsequently, Sections 4 and 5 present and discuss the survey results, respectively, providing a thorough examination of the findings. Lastly, Section 6 discusses the practical implications of the research, while also addressing its limitations and offering recommendations for future studies.

2. THEORETICAL BACKGROUND

Following Facebook's rebranding to Meta in 2021, the metaverse has gained widespread recognition and relevance. Yang et al. have conducted extensive literature-based research to explore the intersection of blockchain technology and artificial intelligence within the metaverse. Their findings suggest that these technologies are expected to play vital roles in creating a virtual environment where individuals can "safely and freely engage in social and economic activities that transcend the limits of the real world" *(Yang et al., 2022)*. Similarly, Huynh-The et al. have conducted a thorough review focusing on the use cases of blockchain in the metaverse. Their analysis reveals that blockchain technology offers solutions to various technical challenges encountered in the metaverse, including data storage, data sharing, and privacy concerns, among others. The authors conclude that blockchain has the potential to address these issues effectively *(Huynh-The et al., 2023)*. Others argue that, even if the metaverse does not achieve wide adoption, cryptocurrencies and the fractional ownership opportunities they present are likely to persist as significant components of the digital landscape, making it an important topic for further investigation *(Belk et al., 2022)*.

2.1 Cryptocurrencies

In 2008, Satoshi Nakamoto established the groundwork for cryptocurrencies with the introduction of Bitcoin. While initially meant solely as a unit of transaction, cryptocurrencies evolved to incorporate many use-cases in the decade after. As of 2023, there were approximately 23000 different cryptocurrencies (*Hicks, 2023*). Reception of cryptocurrency technology has been mixed. Supporters of cryptocurrencies argue for its decentralized

[6] Software which is not controlled by one party *(Wu et al., 2019)*
[7] The keywords used were "cryptocurrenc*" AND "financial inclusion" OR "digital divide", resulting in 60 scientific papers, of which the abstracts were analyzed to find similarities
[8] Multiple blockchains being able to communicate with each other

nature, allowing full user control, privacy and anonymity *(Tambe, 2023)*. Additionally, the absence of intermediaries leads to relatively low transaction fees, making cryptocurrencies well-suited for international transfers *(Fintech News, 2023)*. However, individual coins exhibit significant volatility, with daily fluctuations ranging from 4% (bitcoin) to 8% (solana) against the USD in 2021, making them less reliable as a consistent store of value[9] *(Armstrong, 2022)*. Backing these findings, David Vidal-Tomas conducted a thorough analysis of metaverse economies, and concluded that the various cryptocurrencies (often in the form of NFTs) could not be defined as reliable virtual currencies due to their volatile nature and negative performance compared to traditional alternatives such as fiat currencies[10] *(Vidal-Tomás, 2023)*. Moreover, the irreversibility of trades and the absence of financial institutions to assist with lost private keys pose a significant risk for less technologically skilled individuals and can make them vulnerable to fraud. Thus, careful technological development and regulation are necessary. For a more technical analysis of cryptocurrencies and the blockchain technology backing it, Vejacka's "Basic Aspects of Cryptocurrencies" can be referred to *(Vejačka, 2014)*.

2.2 Financial inclusion and the digital divide

Modern assumptions recognize inequality as a significant concern[11]. Extensive evidence suggests that digitization contributes to increased inequality, both at the individual and group levels *(Burstein et al., 2019; Gaggl & Wright, 2017)*. This phenomenon is often referred to as the 'digital divide,' representing the gap between the 'information-haves' and 'have-nots,' or even described as 'information apartheid' *(Light, 2009; Morehead, 2000)*. The understanding of digital inequality has evolved over time, with the introduction of the 'Digital Divide' framework by the NTIA in 1996. Initially focused on the access gap, the framework later expanded to include usage gaps and digital skills gaps, and subsequently explored outcome gaps related to the benefits and outcomes resulting from the utilization of digital technologies *(Van Dijk, 2020)*. However, this framework has not yet been applied to the specific challenges presented by the integration of cryptocurrencies in the metaverse, indicating the need for further research, particularly when examining the impact of cryptocurrencies on financial inclusion.

Financial inclusion, as defined by the World Bank, involves providing individuals and businesses with access to affordable and useful financial products and services in a responsible and sustainable manner *(World Bank, n.d.)*. Cryptocurrencies present both opportunities and challenges for improving financial inclusion in the digital realm. Proponents argue that cryptocurrencies, with their decentralized nature, can facilitate financial inclusion by enabling direct peer-to-peer transactions and empowering the unbanked *(Ozili, 2022)*. Additionally, cryptocurrencies may offer prospects for wealth creation and economic engagement, particularly for individuals who are excluded from traditional financial systems *(Filippi & Hassan, 2016)*.

However, it is crucial to consider the drawbacks and challenges associated with cryptocurrencies. Their inherent price volatility can lead to financial instability for consumers *(Bouri et al., 2018),* and the lack of regulatory measures can expose individuals to risks of fraud and hacking *(Kerr et al., 2023)*. Moreover, limited technological resources and skills may hinder access to cryptocurrencies, given the complexity of the technology involved.

3. METHODOLOGY

The previous sections of this paper emphasize the growing importance of cryptocurrencies in metaverse economies and the concerns surrounding financial inclusion and the digital divide, especially with regards to education. The aim of this study is to discover new perspectives on the relationship between education level and attitude towards cryptocurrencies. Subsequent sections present an overview of the specific methods employed, including the survey design, data collection process, and the statistical analysis techniques applied.

3.1 Research design

The data was collected through a survey that included statements related to cryptocurrencies, allowing participants to express their level of agreement on a Likert scale. The Likert scale enables the assessment and comparison of individual agreement levels by giving respondents a range of alternatives including "strongly disagree", “slightly disagree”, “neutral”, “slightly agree” and "strongly agree." These can be translated to an ordinal scale from 1-5 enabling us to analyze how participants' impressions of cryptocurrencies relate to their education level. The results indicate if there is a significant difference between responses between respondents of different education levels in our research. The findings from the survey and statistical analyses are utilized to shed light on the potential adaptation hurdles that cryptocurrency faces.

3.1.1 Questionnaire development

The objective of the questionnaire is to gather three sets of variables: education level, cryptocurrency usage and attitudes towards cryptocurrencies. To ensure participant engagement and to allow for statistical analysis, the questionnaire consists mostly of short, close-ended questions. Hemantha conducted a systematic literature review to identify the factors influencing cryptocurrency adoption, largely overlapping with the categories

[9] In comparison, the daily volatility of the EUR/USD trading pair typically falls between 0.5% and 1% *(Mitchell, 2023)*

[10] Government currencies that are not backed by commodities

[11] Refer to appendix B: History of equality

captured by Li et al. in their research towards factors that influence consumer intentions to participate in cryptocurrency transactions *(Hemantha, 2021; Li et al., 2023)*. This research uses the various aspects they established as a basis for the survey items. They can be summarized as follows:

- Perceived benefits and advantages
- Perceived risks and concerns
- Trust and credibility
- Knowledge and awareness
- User experience and usability
- Regulatory environment
- Social influence

Using the identified categories, we developed a series of 13 statements to effectively capture participants' attitudes towards cryptocurrencies across multiple dimensions. We included a balanced mix of positively and negatively phrased questions to reduce response bias *(Sauro, 2011)*. Furthermore, we ask about the education level of the participant, which is divided into basic/intermediate (ISCED[12] categories 0-5, high school and below) and advanced (ISCED categories 6-8, bachelor's degree and above). This split is made to optimize the statistical relevance of the relatively small sample. Age and gender were asked to help evaluate the sample diversity and contextualize the replies. Appendix C can be referred to for a more extensive overview of the survey development, statement categorization and assumptions made in the process.

3.2 Sampling

It is important to include a diverse range of individuals from various education levels in order to gain relevant results. Considering the constraints of time and cost, a convenience sampling approach was employed for participant selection. This involves utilizing both personal networks and the online platform "Prolific," which is used for recruiting participants for academic surveys. The use of convenience sampling allows for a more efficient and practical data collection process. In total 150 participants were recruited through the Prolific platform. Additionally, by utilizing the "Prolific" platform, a broader range of individuals can be reached, contributing to the diversity of the sample. This research is limited to respondents in the U.S. and Europe. Respondents who selected "other" as their education level were excluded from the analysis due to the inability to categorize them into the predefined low or high education categories.

3.3 Data Analysis

We aim to examine the association between nominal (education level) and ordinal (Likert scale items) variables in our analysis. The chi-square test is normally used to test for a significant relationship. However, considering the relatively small sample size, we employed Fisher's exact test for items where more than 20% of the cells have an expected value of less than 5, following recommendations from Kim's statistical guideline for clinical researchers *(Kim, 2017)*. It is worth noting that, although an ongoing topic of debate amongst scholars, a Cronbach's alpha level of 0.05 is employed, as it is the most commonly used threshold. The results of these statistical tests indicate whether the null hypothesis can be rejected, providing evidence (95% confidence) for the presence or absence of a relationship between the dependent variable (responses on survey items) and the independent variable (education level).

Null hypothesis

H_0: There is no association between education and attitude towards the statement. They are independent.

Alternative hypothesis

H_A: A relationship between education and attitude towards the statement exists in the population.

The statistical analysis is conducted in IBM SPSS Statistics (Version 28). Significance testing is conducted to examine the correlation between education level and cryptocurrency usage, as well as each of the 13 statements (according to the hypotheses above). Setting α at 0.05, any test result below 0.05 leads to the rejection of the null hypothesis and implies a correlation between the dependent and independent variable under consideration. The subsequent section presents the outcomes obtained.

4. RESULTS

4.1 Demographics

In this section the demographic characteristics of the survey sample (n=156) are presented. They give insights into the sample's make-up and provide context for subsequent analysis of survey responses. The demographic characteristics examined in this section include age, gender and education. Appendix D can be referred to for an overview of sample nationalities.

Table 1. Sample age.

Gender	Mean	Median	N
Female	34.74	33.00	93
Male	34.28	31.00	61
Other	24.50	24.50	2
Total	34.43	31.50	156

As displayed in **table 1**, the sample includes 93 participants that identify as female, 61 that identify as male and 2 that identify as neither male or female, here categorized as "other". The female category is of a slightly higher average and median age, however, as **figure 1** displays, both genders are represented by a diverse range of participants across different age brackets.

[12] International Standard Classification of Education (*ISCED*, n.d.)

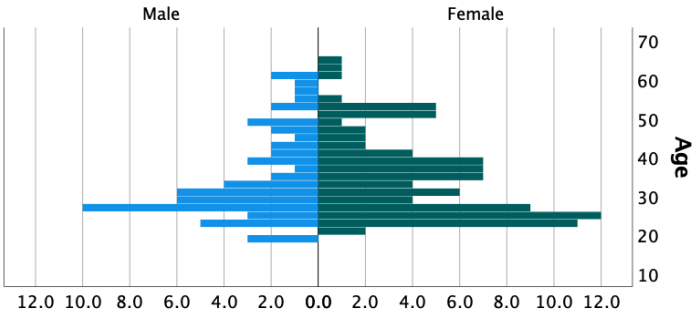

Figure 1. Sample age by gender.

The education distribution within the sample is displayed in **table 2.** 51 participants group into the category "low education" (high school), while 105 group into the category "high education" (bachelor's degree and above).

Table 2. Sample education.

	Frequency	Percent
Bachelor's degree	64	41.0
High school	51	32.7
Master's degree	38	24.4
PhD or Doctorate	3	1.9
Total	156	100.0

4.2 Correlation between education and use

A chi-square analysis was conducted to investigate the correlation between education levels and the usage of cryptocurrencies among the sample population (n=156). The significance level used for the analysis was set at 0.05. The results of the chi-square analysis revealed no significant association between education levels and the usage or past usage of cryptocurrencies ($p > 0.05$). Thus, the null hypothesis, which stated no significant correlation between education and cryptocurrency usage, was not rejected at the 0.05 significance level. As can be seen in **table 2**, the percentage of participants that uses or has used cryptocurrencies in the past is nearly identical for both groups. A more detailed overview of the statistical results can be found in Appendix E.

Table 2. Cryptocurrency use by education level.

		Uses or has used cryptocurrencies in the past	
		No	Yes
Education groups	Low (high school or lower)	30	21
		58.8%	41.2%
	High (bachelor's degree or higher)	63	42
		60.0%	40.0%
Total		93	63
		59.6%	40.4%

4.3 Correlation between education and attitude towards cryptocurrencies

The survey results and their analysis are presented in this section. The purpose of the survey was to obtain data on participants' attitudes towards cryptocurrencies. Participants were asked to rate how strongly they agreed or disagreed with each of the statements using a 5-step Likert scale including "strongly disagree" (1), "slightly disagree" (2), "neutral" (3), "slightly agree" (4) and "strongly agree" (5).

4.3.1 Descriptive statistics

Descriptive statistics were calculated to provide an understanding of participants' attitudes towards each of the statements, grouped by education level. The mean represents the average Likert score obtained from the education group's responses to a specific statement. Standard deviation is included to display the variability of responses within the group, with a high standard deviation indicating a higher spread. The results are discussed grouped by their category (as prescribed in the survey design, appendix C). An extensive overview of all descriptive results are displayed in appendix F.

4.3.1.1 Perceived benefits and advantages

The lower educated group and the higher educated group both exhibit a relatively neutral attitude towards the belief that cryptocurrencies will change the financial system, as indicated by average Likert scores of 2.92 and 3.12 respectively. **Table 3** shows a slightly negative sentiment regarding the belief that cryptocurrencies will improve financial inclusion, with average scores of 2.67 and 2.66 for the two groups respectively. Interestingly, the higher educated group's responses display a wider spread, with a standard deviation of 1.175 compared to 0.993.

Table 3. "I think cryptocurrencies can help more people access and use financial services." * Education level.

Education groups	Mean	Std. Deviation
Low (high school or lower)	2.67	.993
High (bachelor's degree or higher)	2.66	1.175
Total	2.66	1.116

4.3.1.2 Perceived risks and concerns

Both the lower educated group and the higher educated group are concerned with the risks associated with adopting cryptocurrencies. **Table 4** displays their recognition of the risk of fraud, as shown by average Likert scores of 3.90 and 4.11 respectively. Likewise, they express worries about the potential misuse of cryptocurrencies by criminals, with an average Likert score of 3.95 for the higher educated group compared to 3.57 for the lower educated group.

Table 4. "I'm concerned about the possibility of scams and frauds related to cryptocurrencies."

Education groups	Mean	Std. Deviation
Low (high school or lower)	3.90	1.100
High (bachelor's degree or higher)	4.11	.944
Total	4.04	.999

Both groups share the belief that cryptocurrencies are highly volatile assets, as indicated by average Likert scores of 4.20 for the lower educated group and 4.27 for the higher educated group. They also have doubts regarding the long-term sustainability of cryptocurrencies, with average responses of 3.39 and 3.54 for the lower educated and higher educated groups respectively. Interestingly, the environmental impact of cryptocurrencies does not seem to be of significant to the sample. Both the lower educated and higher educated groups adopt a relatively neutral stance, with scores of 2.76 and 3.06 respectively.

4.3.1.3 Trust and credibility

Once again, both the lower educated group and the higher educated group demonstrate a relatively neutral stance towards trust in the underlying technology of cryptocurrencies, as indicated by an average Likert score of 2.76 for the lower educated group and 2.88 for the higher educated group. However, when it comes to the belief that cryptocurrencies serve as a secure medium for online payments, slightly more skepticism is observed. The groups provide an average response of 2.51 and 2.50 respectively, as illustrated in table 5.

Table 5. "I believe that cryptocurrencies are a safe and reliable way to make payments online." * Education level.

Education groups	Mean	Std. Deviation
Low (high school or lower)	2.51	1.046
High (bachelor's degree or higher)	2.50	1.102
Total	2.51	1.081

4.3.1.4 User experience and usability

As seen in table 6, both groups slightly agree with the notion that there are too few situations where cryptocurrencies can be used, with the lower educated group displaying a mean score of 3.51 compared to the higher educated group's 3.39 being slightly more neutral.

Table 6. "I think there are too few situations where cryptocurrencies can be used." * Education level.

Education groups	Mean	Std. Deviation
Low (high school or lower)	3.51	1.007
High (bachelor's degree or higher)	3.39	1.105
Total	3.43	1.072

When it comes to the ease of use of cryptocurrencies, a similar level of skepticism is apparent. On average, the groups display Likert responses of 2.25 and 2.31 respectively to the notion that cryptocurrencies are easy to understand and use. It is worth noting that the range of responses exhibits significant variability, as indicated by a combined standard deviation of 1.160.

4.3.1.5 Regulatory environment, social influence

Table 7. "I think there are enough rules and regulations for cryptocurrencies." * Education level.

Education groups	Mean	Std. Deviation
Low (high school or lower)	2.41	.920
High (bachelor's degree or higher)	2.26	1.038
Total	2.31	1.001

On average, both groups disagree with the statement that there are sufficient rules and regulations for cryptocurrencies. The lower educated group provides a mean response of 2.41, while the higher educated group slightly disagrees more, with a mean response of 2.26. The lowest response scores are observed for the final statement. Both groups disagree with the statement that they feel encouraged by their social circle to use cryptocurrencies. The average responses are 2.04 for the lower educated group and 1.95 for the higher educated group.

After examining the descriptive statistics, tests for significance were conducted for each of the statements. This was done to see if the observed relationships were statistically meaningful or simply due to chance. The results are displayed in the next section.

4.3.2 Significance tests

The significance of the relationships between education level and attitude towards specific survey statements was evaluated using chi-square and Fischer exact tests. Based on the research conducted with a sample size of 156 participants, there was no significant evidence to reject the null hypothesis that the attitudes of low education groups towards cryptocurrencies differ from those of high education groups (alpha = 0.05) for most of the statements. However, three statements showed significant evidence to reject the null hypothesis. These statements were "I believe that cryptocurrencies are a safe and reliable way to make payments online," "I'm concerned about the possibility of scams and frauds related to cryptocurrencies," and "I think cryptocurrencies can help more people access and use financial services.". The test results are displayed in **table 14.** A test result of less than 0.05 for either Fisher's exact test or Chi-square test indicates that the null hypothesis can be rejected,

indicating a significant correlation between education and the specific statement ($\alpha = 0.05$).

Table 14. Correlation significance.

Statement	Test	Significance (2-sided)	Significant
"I'm concerned about the possibility of scams and frauds related to cryptocurrencies."	**Fisher's exact test**	**0.044**	**Yes**
"I trust the technology that makes cryptocurrencies work."	Chi-square test	0.576	No
"I believe that cryptocurrencies will change the way we handle money and banking."	Fisher's exact test	0.650	No
"I'm worried about a potential negative impact on the environment caused by cryptocurrencies."	Chi-square test	0.277	No
"I think cryptocurrencies can help more people access and use financial services."	**Chi-square test**	**0.036**	**Yes**
"I think there are enough rules and regulations for cryptocurrencies."	Fisher's exact test	0.114	No
"I find cryptocurrencies to be risky because their value can change a lot."	Fisher's exact test	0.723	No
"I find it easy to understand and use cryptocurrencies."	Chi-square test	0.929	No
"I have doubts about whether cryptocurrencies will last for a long time."	Fisher's exact test	0.428	No
"I believe that cryptocurrencies are a safe and reliable way to make payments online."	**Fisher's exact test**	**0.037**	**Yes**
"I'm worried that criminals might use cryptocurrencies for illegal activities."	Fisher's exact test	0.137	No
"I think there are too few situations where cryptocurrencies can be used."	Fisher's exact test	0.876	No
"People in my social circle encourage the usage of cryptocurrencies."	Fisher's exact test	0.517	No

The full statistical analysis is provided in Appendix H, including the distribution of replies per education group. For the statistically relevant groups, these are visualized in Appendix H. In the subsequent section, we discuss the nature of the relationship between education level and each of the responses that were found to be statistically significant. This discussion aims to improve the understanding of these relationships.

5. DISCUSSION

The survey findings provide valuable insights into the discussion on financial inclusivity in the metaverse. When considering the perceived advantages of cryptocurrencies, the respondents exhibit a relatively neutral stance across various statements. However, there is a notable concern expressed regarding the risk of fraud and criminal activity associated with cryptocurrencies. This does not come as a surprise, as a record 3.8 billion USD in cryptocurrencies was defrauded by cybercriminals in 2022 alone (*Persona, 2023*). Further stressing these concerns, the participants find the cryptocurrency market to be under-regulated. These findings highlight the need for increased regulation if these currencies are to be widely used in metaverse economies.

The results also reveal skepticism regarding the long-term viability of cryptocurrencies, as many respondents find them difficult to use with a limited number of use-cases. This observation is relevant to the usage aspect of the digital divide. While internet access has become more widespread, other barriers to use have become a bigger obstacle (*Prins*, 2021). When participants were asked to rate their agreement with the statement "I find it easy to understand and use cryptocurrencies.", the average Likert score of 2.29 indicated that cryptocurrencies are not perceived to be user-friendly. Although both lower and higher education groups scored relatively similarly (2.25 for the lower group and 2.31 for the higher group), the overall standard deviation of responses was 1.160, suggesting a relatively wide spread of opinions compared

to other statements. One respondent captured this sentiment by stating “it [cryptocurrencies] will exclude many people from transactions because they don’t use it or understand it.”. While this exclusion cannot be solely attributed to education level in this case, these findings stress the need for further research, incorporating both quantitative and qualitative approaches, to gain a deeper understanding of the underlying factors that influence these responses and prevent potential barriers to cryptocurrency usage from creating a digital divide in the metaverse.

In terms of the overall variability between participant groups, the survey findings indicate a lack of clear correlation between education level and both cryptocurrency usage and attitudes for most statements towards cryptocurrencies. Out of the 13 statements examined, only three statements showed a statistically significant correlation with education level, and even within those three statements, the mean differences were relatively small, attributing the statistical significance (alpha = 0.05) mainly towards a difference in standard deviation.

The lack of a correlation between education and cryptocurrency related variables that this study found raises questions regarding the relationship between education, financial inclusion, and the metaverse. The introduction discussed previous research that demonstrated a significant positive relationship between education and financial inclusion in various regions, such as China, India, and South America *(Fungáčová & Weill, 2015; Ghosh & Vinod, 2017; Kazemikhasragh & Buoni Pineda, 2022).* However, our findings suggest that this relationship may not be the same within the context of a metaverse governed by cryptocurrencies.

While Drummond et al. found that a higher education level positively correlates with more polarized views on various issues, we fail to find such evidence in this research *(Drummond & Fischhoff, 2017).* Eight out of thirteen statements show a higher standard deviation for the lower educated group response (when solely observing statistically significant results, this number is reduced to one out of three), indicating a relatively even spread of responses between the two education levels .

5.1 Practical implications

In light of the digital divide and financial inclusivity, the lack of clear evidence that the lower education group is excluded, or self-excludes based on their attitude towards cryptocurrencies can be seen as a positive outcome. However, it is important to acknowledge how several limitations, such as the online nature of this survey, may have introduced a bias towards those participants with more technological knowledge. These limitations will be further examined in section 5.3.

From a practical perspective, the findings of this paper highlight the importance of targeted strategies for promoting financial inclusion within the metaverse. Education alone may not be sufficient to ensure inclusive and equal participation in the metaverse economy. Instead, efforts should be directed towards addressing a more diverse range of barriers to access and use, such as technological infrastructure, digital literacy, regulations to create a safe environment, and the availability of user-friendly platforms and services.

5.2 Theoretical implications

The lack of correlation discovered in this study may be explained by several factors. Firstly, the absence of a correlation found in this research may indicate that the current usage of and attitudes towards cryptocurrencies among individuals in our survey may not indicate future financial inclusion or exclusion if cryptocurrencies were to become more widely adopted. For example, it does not tell us anything about the adaptability of lower educated groups compared to those with better schooling, as this study does not provide insights into the participants’ capacity for adjustment. Furthermore, it is likely that the factors influencing cryptocurrency adoption and attitudes are not solely determined by education but rather influenced by a complex interplay of various social, cultural, and economic factors. Another possible explanation is that the metaverse operates under different dynamics compared to traditional financial systems. Here, factors other than education level may be more influential in determining financial inclusion. These factors could include technological literacy, access to digital infrastructure, availability of financial services, and individuals' comfort with digital platforms. From a theoretical perspective, the findings of this paper shed light on the complexity of financial inclusion in the context of the metaverse. The lack of a clear correlation with education level suggests the need to consider alternative factors and frameworks when examining financial inclusion in the metaverse. The following section will discuss some of the limitations of this research.

5.3 Limitations

This study has several limitations that should be taken into account. First, the sample size is relatively small, suggesting the need for further research with a larger and more diverse sample to enhance generalizability. Additionally, by using a bigger sample size, there is no need to categorize education levels into high and low, creating a better understanding of differences between sub-groups.

Furthermore, not all participants may have fully understood the questions, either due to unfamiliarity with cryptocurrencies or not fully understanding the specific wording. Although efforts were made to phrase the questions in an understandable way, there may still be some impact on responses. The conscious decision was made not to provide too much context to participants, in order to not influence their initial perceptions.

Another important consideration is that the study primarily focused on respondents who were active on the Prolific platform. While the sampling method included participants from the U.S. as well as Europe, actual participants were mainly from Europe, which limits the generalizability of the findings to other geographic regions. The online nature of the survey could have introduced a bias towards individuals who are more proficient in digital technologies, potentially excluding certain demographics. Future research could include non-digital means of gathering data to avoid this limitation.

As a small monetary compensation of 30 cents was awarded to participants through the Prolific platform, this could have biased the sample towards individuals more motivated by financial incentives. This might have also introduced a response bias, as participants may have responded in a careless manner to expedite payment, affecting data reliability. Furthermore, the self-selection bias may have influenced the attitudes of participants, as they volunteered to take part in the study. Finally, while efforts were made to carefully consider the questions, the survey may not have captured all aspects of attitudes towards cryptocurrencies, potentially overlooking other relevant factors.

5.4 Future research

The findings suggest that the metaverse may challenge the traditional understanding of the relationship between education and financial inclusion. As cryptocurrencies continue to evolve, it is essential to explore additional factors beyond education that shape individuals' experiences and interactions within the metaverse. Future research should delve deeper into the other factors that shape financial inclusion and explore alternative frameworks that include socio-economic, technological and cultural factors to capture the complexities of the metaverse. The next section summarizes and provides concluding remarks for this paper.

6. CONCLUSION

Through analyzing the responses to an online survey (n=156), this paper has investigated how education and usage of and attitude towards cryptocurrencies relate to each other. Coming back to the research question “To what extent does education level correlate with usage of and attitudes towards cryptocurrencies?", the study found very minimal correlation. Education did not correlate with using or having used cryptocurrencies in the past, and, although 3 out of 13 statements showed significant correlation with education level, these correlations were mostly due to a minor difference in standard deviation.

These findings challenge earlier studies that show a clear correlation between education and financial inclusion. Possible explanations may be that metaverse economies operate under a different dynamic than traditional systems, or that various other factors, such as technological literacy, access to digital infrastructure, availability of financial services, and individuals' comfort with digital platforms are more influential. The study's shortcomings, including its narrow regional emphasis and small sample size, amongst others, underscore the need for more research using more varied and sizeable sample sizes. In order to better comprehend financial inclusion inside a metaverse where cryptocurrencies reign supreme, researchers should take these restrictions into account, for example by including other relevant factors and frameworks.

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Appendix A: Metaverse

The concept of virtual worlds has been present for nearly two centuries. It wasn't until the early 90s however, years before the widespread adoption of the internet[13], that author Neal Stephenson first mentioned the term "metaverse". Stephenson envisioned a world wherein a pizza delivery boy named Hiro entered into a virtual cyber world to combat a mind-altering virus. The resulting novel, "Snow Crash", introduced a range of innovative concepts, among them the concept of the metaverse that closely resembles our understanding of it today.

The metaverse does not adhere to a single definition, however, there appears to be a consensus referring it to a shared virtual space where users can engage with digital environments and interact with each other in real-time (Hwang & Chien, 2022; Kye et al., 2021). It comprises a mixture of key technologies such as Virtual Reality[14] (VR), Augmented Reality (AR) and blockchain. At the time of "Snow Crash", the metaverse was seen as a foreign concept by most. However, due to rapid advances in 5G- internet connectivity and spatial computing, two technologies that are empirical to the proper functioning of many metaverse aspects, it has now gained widespread attention (*What Is a Metaverse?*, n.d.). While initial developments in the metaverse primarily focused on entertainment, it is becoming increasingly clear that its impact can extend far beyond that. The fiction novel "Ready Player One" introduced the concept of "Oasis," a virtual world where people could interact, work, and play, foreshadowing the potential of the metaverse (Cline, 2011).

While some view the metaverse as the next generation internet, mentioning the transformative powers of artificial intelligence and blockchain technology as driving forces, others see it as a commercial vehicle, questioning the utility that the metaverse provides to humanity (George et al., 2021; MacDonald, 2022). This paper focuses not on the topic of whether these technologies will become mainstream, but rather takes notice of the amount of development activity exercised by big corporations and tries to pre-emptively examine risks associated with cryptocurrencies, the metaverse and financial inequalities. This paper adopts a definition which specifically refers to the metaverse as "an interconnected web of ubiquitous virtual worlds partly overlapping with and enhancing the physical world. These virtual worlds enable users represented by avatars to connect and interact with each other, to experience and consume user-generated content in an immersive, scalable, synchronous and persistent environment. An economic system provides incentives for contributing to the Metaverse.", which is in line with the definition of the metaverse as presented by Weinberger, who conducted a systematic, qualitative meta-synthesis of 47 publications to propose a definition as a foundation for future research (Weinberger, 2022).

Appendix B: History of inequality

This wasn't always the case. Early studies on inequality were focused mainly on its economic aspects. Famed economist Adam Smith wrote in his 1776 book 'An Inquiry into the Nature and Causes of the Wealth of Nations' that "Wherever there is great property there is great inequality. For one very rich man, there must be at least five hundred poor, and the affluence of the few supposes the indigence of the many" (*Smith, 1776*). Up and until the 20th century, many scholars echoed Smith's idea that inequality was inherent to the economic functioning of society (Zwart, 2019).

However, as research progressed, scholars began to view inequality as something to be avoided rather than accepted. Nobel economic prize winner Robert Lucas's claim that "...the most seductive, and in my opinion the most poisonous [tendency], is to focus on questions of distribution..." has sparked significant debate (Caplan, 2022). Cordoba et al. challenged this notion by referencing Lucas's 1987 welfare evaluation framework to conclude, according to his own writing, that inequality should be regarded as equally important as economic growth *(Cordoba et al., 2007)*. Negre, a senior economist with the World Bank's Poverty and Equity Global Practice, further dismantled the idea of the growth-inequality tradeoff, concluding that a tradeoff is not inevitable and that research in the first two decades of the 21st century have generated substantial evidence to this end[15] *(Negre et al., 2019)*.

During the 21st century, the study of inequality expanded beyond just the economic dimension to also include social, political, and cultural aspects. Researchers started recognizing the negative impacts of inequality on social disruption[16], trust and solidarity, health[17], and emotional well-being, amongst others. The view of inequality changed as knowledge and evidence grew, placing more emphasis on social

[13] The world wide web was only born in late 1991.
[14] In a combined setting, VR, AR and Mixed Reality (MR) are commonly referred to as Extended Reality (XR).
[15] A recent study has shown a negative correlation between income inequality and economic growth (Topuz, 2022).
[16] An empirical study conducted by Houle et al. found that the degree of inequality is positively correlated with the "Unrest index", as well as revolutions and anti-government demonstrations (Houle et al., 2022).
[17] A study conducted on U.S. citizens between 2006 and 2014 found a significant positive correlation between inequality and physical and mental health problems (Matthew & Brodersen, 2018).

justice and equity. The acceptability of inequality was further contested by movements for civil rights, feminism, and other social justice issues, which promoted fairness and opportunity for all. As the United Nations' World Social Report states "It is increasingly clear that reducing inequalities strengthens not only the social fabric but also the economic and environmental dimensions of sustainable development." *(United Nations, 2020)*. Following the renewed understanding of the consequences of inequality, this research adapts the view that inequality should be contested.

Appendix C: questionnaire

After a test-run with 4 participants, we included some missing items (highlighted in brown).

- Perceived benefits and advantages
  - ***"I think cryptocurrencies will revolutionize the financial system."***
  - ***"I think cryptocurrencies enhance financial inclusion."***
- Perceived risks and concerns
  - ***"I am critical of the long-term sustainability of cryptocurrencies."***
  - ***"I find cryptocurrencies a speculative and volatile asset class."***
  - ***"I find environmental concerns of using cryptocurrency problematic."***
  - ***"I am concerned about the risk of fraud related to using cryptocurrencies."***
  - ***"I am concerned with criminals exploiting cryptocurrencies for illegal activities"***
- Trust and credibility
  - ***"I trust the technology underlying cryptocurrencies."***
  - ***"I think cryptocurrencies are a reliable and secure form of online payment."***
- User experience and usability
  - ***"I find a limited number of use cases to cryptocurrencies"***
  - ***"I find the process of using cryptocurrencies difficult to navigate"***
- Regulatory environment
  - ***"I find the lack of proper regulations of cryptocurrencies problematic."***
- Social influence
  - ***"My social network is encouraging of the usage of cryptocurrencies"***

We include one open ended question to allow for the opportunity to provide context
"Do you have other concerns with cryptocurrencies that were not mentioned in this survey?"

In the next section, we have **modified the questions to use simpler language** that is more accessible and less industry-specific. This adjustment aims to reduce bias resulting from potential misunderstandings. Additionally, we have **randomized the order of the statements** to eliminate any influence of category order on participant responses. At the start of the questionnaire, we provide a statement explaining how the data will be stored and ensuring participant privacy. Since the survey is anonymous, strict GDPR compliance is not explicitly required. Additionally, participants are not required to tick a box for consent. For participants who may be less familiar with cryptocurrencies, a brief introduction is provided.
(https://www.utwente.nl/en/bms/research/ethics-domainHSS/informed-consent-procedure/)

SURVEY

Introductory statement
Dear participant,

Thank you for taking the time to participate in this survey. The objective of this study is to gather insights on individuals' perceptions of various aspects of cryptocurrencies. No personally identifiable information will be collected, ensuring your anonymity and privacy. Your data will be used for research purposes only.

If you have any concerns or questions regarding privacy or data storage, please feel free to contact the following email address: l.p.y.bremers@student.utwente.nl. We are committed to addressing any worries you may have.

By continuing with the survey, you are giving your permission to participate and confirming your awareness of the survey's goal and safety precautions.

Thank you for your valuable contribution.

Best wishes,
Louis Bremers

Brief introduction cryptocurrencies
Cryptocurrencies are digital currencies that operate independently of a central bank. They are based on a technology called blockchain, which keeps track of all the transactions. The most well-known cryptocurrency is Bitcoin, but there are many others too.

Have you used or owned cryptocurrencies in the past?
(yes/no)

Next there will be some statements regarding cryptocurrencies. Please indicate to what extent you agree with the following statements.

1. ***"I'm concerned about the possibility of scams and frauds related to cryptocurrencies."***
   (strongly disagree, slightly disagree, neutral, slightly agree, strongly agree)
2. ***"I trust the technology that makes cryptocurrencies work."***
   (strongly disagree, slightly disagree, neutral, slightly agree, strongly agree)
3. ***"I believe that cryptocurrencies will change the way we handle money and banking."***
   (strongly disagree, slightly disagree, neutral, slightly agree, strongly agree)
4. ***"I'm worried about a potential negative impact on the environment caused by cryptocurrencies."***
   (strongly disagree, slightly disagree, neutral, slightly agree, strongly agree)
5. ***"I think cryptocurrencies can help more people access and use financial services."***
   (strongly disagree, slightly disagree, neutral, slightly agree, strongly agree)
6. ***"I think there are enough rules and regulations for cryptocurrencies."***
   (strongly disagree, slightly disagree, neutral, slightly agree, strongly agree)
7. ***"I find cryptocurrencies to be risky because their value can change a lot."***
   (strongly disagree, slightly disagree, neutral, slightly agree, strongly agree)
8. ***"I find it easy to understand and use cryptocurrencies."***
   (strongly disagree, slightly disagree, neutral, slightly agree, strongly agree)
9. ***"I have doubts about whether cryptocurrencies will last for a long time."***
   (strongly disagree, slightly disagree, neutral, slightly agree, strongly agree)
10. ***"I believe that cryptocurrencies are a safe and reliable way to make payments online."***
    (strongly disagree, slightly disagree, neutral, slightly agree, strongly agree)
11. ***"I'm worried that criminals might use cryptocurrencies for illegal activities."***
    (strongly disagree, slightly disagree, neutral, slightly agree, strongly agree)
12. ***"I think there are too few situations where cryptocurrencies can be used."***

(strongly disagree, slightly disagree, neutral, slightly agree, strongly agree)

13. ***"People in my social circle encourage the usage of cryptocurrencies."***
(strongly disagree, slightly disagree, neutral, slightly agree, strongly agree)

"Do you have other concerns with cryptocurrencies that were not mentioned in this survey?"
(open ended)

What is your age?
(open ended, prefer not to answer)

What is your gender?
(male/female//other/prefer not to answer)

What is your nationality?
(open ended, prefer not to answer)

What is your highest finished education level?
(none, high school, bachelor's degree, master's degree, PhD or doctorate)

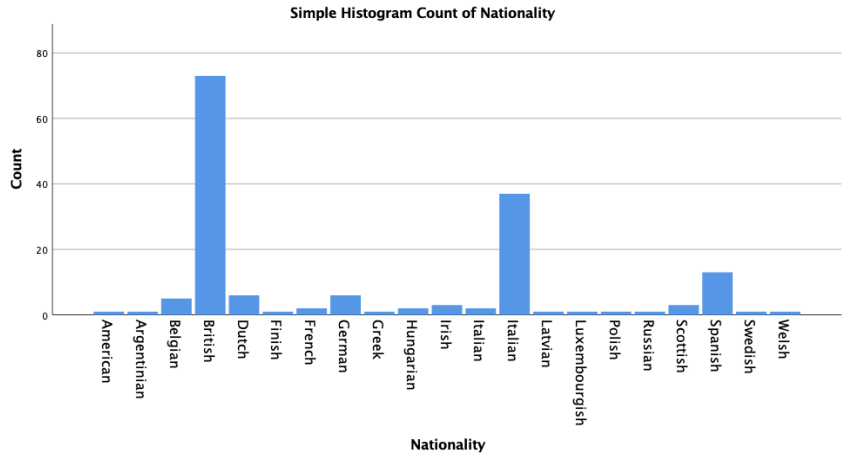
Independent variables for statistical analysis
Dependent variables for statistical analysis
Context questions

Closing statement
Thank you for taking the time to complete this survey. We appreciate your contribution and look forward to using gathered data in our research. If you have any further concerns or questions, feel free to write to me at: l.p.y.bremers@student.utwente.nl.

Assumptions

- Participants have a basic understanding of cryptocurrencies. The introductory sentences should serve merely as a reminder.
- The sample represents a diverse range of individuals.
- The participants answer the questions in an accurate and honest way.
- Participants are willing to share their opinions on potentially sensitive topics.
- The survey questions capture the most important dimensions of cryptocurrencies.

Appendix D - sample nationalities



Appendix E: correlation between education level and having used cryptocurrencies

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
Uses or has used cryptocurrencies in the past * Education groups	156	94.0%	10	6.0%	166	100.0%

*Uses or has used cryptocurrencies in the past * Education groups Crosstabulation*

Count

		Education groups		
		Low (high school or lower)	High (bachelor's degree or higher)	Total
Uses or has used cryptocurrencies in the past	No	30	62	92
	Yes	21	43	64
Total		51	105	156

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.001[a]	1	.979	1.000	.557
Continuity Correction[b]	.000	1	1.000		
Likelihood Ratio	.001	1	.979	1.000	.557
Fisher's Exact Test				1.000	.557
N of Valid Cases	156				

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 20.92.

b. Computed only for a 2x2 table

Appendix F: Descriptive results.

Table 1. "I'm concerned about the possibility of scams and frauds related to cryptocurrencies."

Education groups	Mean	Std. Deviation
Low (high school or lower)	3.90	1.100
High (bachelor's degree or higher)	4.11	.944
Total	4.04	.999

As displayed in **table 1**, both groups show moderate concerns regarding the possibility of scams and frauds related to cryptocurrencies. The higher educated group shows slightly more concern.

Table 2. "'I trust the technology that makes cryptocurrencies work."

Education groups	Mean	Std. Deviation
Low (high school or lower)	2.76	1.050
High (bachelor's degree or higher)	2.88	1.174
Total	2.84	1.133

As displayed in **table 2**, both groups are relatively indifferent regarding their trust in the technology that makes cryptocurrencies work. The higher educated group is slightly less distrustful.

Table 3. "I believe that cryptocurrencies will change the way we handle money and banking."

Education groups	Mean	Std. Deviation
Low (high school or lower)	2.92	1.163
High (bachelor's degree or higher)	3.12	1.044
Total	3.06	1.085

As displayed in **table 3**, both groups are relatively indifferent regarding their belief that cryptocurrencies will change the way we handle money and banking. The higher educated group is slightly more in agreement with the statement.

Table 4. "I'm worried about a potential negative impact on the environment caused by cryptocurrencies."

Education groups	Mean	Std. Deviation
Low (high school or lower)	2.76	1.365
High (bachelor's degree or higher)	3.06	1.277
Total	2.96	1.309

As displayed in **table 4**, both groups are relatively indifferent regarding their belief that cryptocurrencies will have a negative impact on the environment. The higher educated group is slightly more worried.

Table 5. "I think cryptocurrencies can help more people access and use financial services." * Education level.

Education groups	Mean	Std. Deviation
Low (high school or lower)	2.67	.993
High (bachelor's degree or higher)	2.66	1.175
Total	2.66	1.116

As displayed in **table 5**, both groups slightly disagree with the notion that cryptocurrencies can improve financial inclusion.

Table 6. "I think there are enough rules and regulations for cryptocurrencies." * Education level.

Education groups	Mean	Std. Deviation
Low (high school or lower)	2.41	.920
High (bachelor's degree or higher)	2.26	1.038
Total	2.31	1.001

As displayed in **table 6**, both groups slightly disagree with the statement that there are enough rules and regulations for cryptocurrencies. The higher educated group shows a lower level of agreement.

Table 7. "I find cryptocurrencies to be risky because their value can change a lot." * Education level.

Education groups	Mean	Std. Deviation
Low (high school or lower)	4.20	1.000
High (bachelor's degree or higher)	4.27	.858
Total	4.24	.904

As displayed in **table 7**, both groups find cryptocurrencies to be risky because of their recurring changes in value.

Table 8. "I find it easy to understand and use cryptocurrencies." * Education level.

Education groups	Mean	Std. Deviation
Low (high school or lower)	2.25	1.214
High (bachelor's degree or higher)	2.31	1.138
Total	2.29	1.160

As displayed in **table 8**, both groups slightly disagree with the statement that it is easy for them to understand and use cryptocurrencies.

Table 9. "I have doubts about whether cryptocurrencies will last for a long time." * Education level.

Education groups	Mean	Std. Deviation
Low (high school or lower)	3.39	1.041
High (bachelor's degree or higher)	3.54	.961
Total	3.49	.987

As displayed in **table 9**, both groups have slight doubts about whether cryptocurrencies will last for a long time, with the lower educated group being slightly more indifferent.

Table 10. "I believe that cryptocurrencies are a safe and reliable way to make payments online." * Education level.

Education groups	Mean	Std. Deviation
Low (high school or lower)	2.51	1.046
High (bachelor's degree or higher)	2.50	1.102
Total	2.51	1.081

As displayed in **table 10**, both groups slightly disagree with the statement that cryptocurrencies are a safe and reliable way to make payments online.

Table 11. "I'm worried that criminals might use cryptocurrencies for illegal activities." * Education level.

Education groups	Mean	Std. Deviation
Low (high school or lower)	3.57	1.237
High (bachelor's degree or higher)	3.95	.994
Total	3.83	1.091

As displayed in **table 11**, both groups are slightly worried that criminals might use cryptocurrencies for illegal activities, with the higher educated group being more worried.

Table 12. "I think there are too few situations where cryptocurrencies can be used." * Education level.

Education groups	Mean	Std. Deviation
Low (high school or lower)	3.51	1.007
High (bachelor's degree or higher)	3.39	1.105
Total	3.43	1.072

As displayed in **table 12**, both groups slightly agree that there are too few situations where cryptocurrencies can be used, with the higher educated group being more indifferent.

Table 13. "People in my social circle encourage the usage of cryptocurrencies." * Education level.

Education groups	Mean	Std. Deviation
Low (high school or lower)	2.04	1.248
High (bachelor's degree or higher)	1.95	1.086
Total	1.98	1.139

As displayed in **table 13**, both groups slightly disagree with the statement that their social circle encourages the usage of cryptocurrencies.

Appendix G: Test results for significance.

1.

I'm concerned about the possibility of scams and frauds related to cryptocurrencies * Education groups

Crosstab

Count

		Education groups		
		Low (high school or lower)	High (bachelor's degree or higher)	Total
I'm concerned about the possibility of scams and frauds related to cryptocurrencies	Strongly disagree	1	3	4
	Slightly disagree	8	3	11
	Neutral	3	14	17
	Slightly agree	22	44	66
	Strongly agree	17	41	58
Total		51	105	156

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)	Point Probability
Pearson Chi-Square	10.183[a]	4	.037	.034		
Likelihood Ratio	9.754	4	.045	.060		
Fisher-Freeman-Halton Exact Test	9.336			.044		
Linear-by-Linear Association	1.551[b]	1	.213	.233	.124	.031
N of Valid Cases	156					

a. 3 cells (30.0%) have expected count less than 5. The minimum expected count is 1.31.

2.

I trust the technology that makes cryptocurrencies work * Education groups

Crosstab

Count

		Education groups		
		Low (high school or lower)	High (bachelor's degree or higher)	Total
I trust the technology that makes cryptocurrencies work	Strongly disagree	7	14	21
	Slightly disagree	12	28	40
	Neutral	20	29	49
	Slightly agree	10	25	35
	Strongly agree	2	9	11
Total		51	105	156

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)	Point Probability
Pearson Chi-Square	2.928[a]	4	.570	.576		
Likelihood Ratio	2.999	4	.558	.569		
Fisher-Freeman-Halton Exact Test	2.743			.617		
Linear-by-Linear Association	.332[b]	1	.564	.599	.309	.051
N of Valid Cases	156					

a. 1 cells (10.0%) have expected count less than 5. The minimum expected count is 3.60.

3.

I believe that cryptocurrencies will change the way we handle money and banking * Education groups

Crosstab

Count

		Education groups		
		Low (high school or lower)	High (bachelor's degree or higher)	Total
I believe that cryptocurrencies will change the way we handle money and banking	Strongly disagree	7	8	15
	Slightly disagree	12	20	32
	Neutral	13	35	48
	Slightly agree	16	35	51
	Strongly agree	3	7	10
Total		51	105	156

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)	Point Probability
Pearson Chi-Square	2.427[a]	4	.658	.665		
Likelihood Ratio	2.371	4	.668	.676		
Fisher-Freeman-Halton Exact Test	2.516			.650		
Linear-by-Linear Association	1.193[b]	1	.275	.307	.156	.035
N of Valid Cases	156					

a. 2 cells (20.0%) have expected count less than 5. The minimum expected count is 3.27.

4.

I'm worried about a potential negative impact on the environment caused by cryptocurrencies * Education groups

Crosstab

Count

		Education groups		
		Low (high school or lower)	High (bachelor's degree or higher)	Total
I'm worried about a potential negative impact on the environment caused by cryptocurrencies	Strongly disagree	13	13	26
	Slightly disagree	9	27	36
	Neutral	12	22	34
	Slightly agree	11	27	38
	Strongly agree	6	16	22
Total		51	105	156

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)	Point Probability
Pearson Chi-Square	5.148[a]	4	.272	.277		
Likelihood Ratio	4.987	4	.289	.302		
Fisher-Freeman-Halton Exact Test	4.920			.295		
Linear-by-Linear Association	1.712[b]	1	.191	.194	.107	.022
N of Valid Cases	156					

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 7.19.

5.

I think cryptocurrencies can help more people access and use financial services * Education groups

Crosstab

Count

		Education groups		
		Low (high school or lower)	High (bachelor's degree or higher)	Total
I think cryptocurrencies can help more people access and use financial services	Strongly disagree	4	18	22
	Slightly disagree	20	35	55
	Neutral	20	24	44
	Slightly agree	3	21	24
	Strongly agree	4	7	11
Total		51	105	156

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)	Point Probability
Pearson Chi-Square	10.213[a]	4	.037	.036		
Likelihood Ratio	11.074	4	.026	.032		
Fisher-Freeman-Halton Exact Test	10.371			.032		
Linear-by-Linear Association	.003[b]	1	.960	1.000	.509	.061
N of Valid Cases	156					

a. 1 cells (10.0%) have expected count less than 5. The minimum expected count is 3.60.

6.

I think there are enough rules and regulations for cryptocurrencies * Education groups

Crosstab

Count

		Education groups		
		Low (high school or lower)	High (bachelor's degree or higher)	Total
I think there are enough rules and regulations for cryptocurrencies	Strongly disagree	6	28	34
	Slightly disagree	25	38	63
	Neutral	15	25	40
	Slightly agree	3	12	15
	Strongly agree	2	2	4
Total		51	105	156

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)	Point Probability
Pearson Chi-Square	6.959[a]	4	.138	.133		
Likelihood Ratio	7.372	4	.117	.138		
Fisher-Freeman-Halton Exact Test	7.143			.114		
Linear-by-Linear Association	.819[b]	1	.365	.395	.206	.045
N of Valid Cases	156					

a. 3 cells (30.0%) have expected count less than 5. The minimum expected count is 1.31.

7.

I find cryptocurrencies to be risky because their value can change a lot * Education groups

Crosstab

Count

		Education groups		
		Low (high school or lower)	High (bachelor's degree or higher)	Total
I find cryptocurrencies to be risky because their value can change a lot	Strongly disagree	2	1	3
	Slightly disagree	2	4	6
	Neutral	3	10	13
	Slightly agree	21	41	62
	Strongly agree	23	49	72
Total		51	105	156

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)	Point Probability
Pearson Chi-Square	2.178[a]	4	.703	.742		
Likelihood Ratio	2.084	4	.720	.784		
Fisher-Freeman-Halton Exact Test	2.254			.723		
Linear-by-Linear Association	.209[b]	1	.647	.708	.355	.066
N of Valid Cases	156					

a. 5 cells (50.0%) have expected count less than 5. The minimum expected count is .98.

8.

I find it easy to understand and use cryptocurrencies * Education groups

Crosstab

Count

		Education groups		
		Low (high school or lower)	High (bachelor's degree or higher)	Total
I find it easy to understand and use cryptocurrencies	Strongly disagree	17	29	46
	Slightly disagree	16	36	52
	Neutral	9	23	32
	Slightly agree	6	12	18
	Strongly agree	3	5	8
Total		51	105	156

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)	Point Probability
Pearson Chi-Square	.858[a]	4	.930	.929		
Likelihood Ratio	.858	4	.931	.929		
Fisher-Freeman-Halton Exact Test	1.011			.923		
Linear-by-Linear Association	.090[b]	1	.764	.770	.413	.056
N of Valid Cases	156					

a. 1 cells (10.0%) have expected count less than 5. The minimum expected count is 2.62.

9.

I have doubts about whether cryptocurrencies will last for a long time * Education groups

Crosstab

Count

		Education groups		
		Low (high school or lower)	High (bachelor's degree or higher)	Total
I have doubts about whether cryptocurrencies will last for a long time	Strongly disagree	2	5	7
	Slightly disagree	8	7	15
	Neutral	16	32	48
	Slightly agree	18	48	66
	Strongly agree	7	13	20
Total		51	105	156

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)	Point Probability
Pearson Chi-Square	3.897[a]	4	.420	.435		
Likelihood Ratio	3.725	4	.445	.468		
Fisher-Freeman-Halton Exact Test	3.885			.428		
Linear-by-Linear Association	.800[b]	1	.371	.389	.210	.046
N of Valid Cases	156					

a. 3 cells (30.0%) have expected count less than 5. The minimum expected count is 2.29.

10.

I believe that cryptocurrencies are a safe and reliable way to make payments online * Education groups

Crosstab

Count

		Education groups		
		Low (high school or lower)	High (bachelor's degree or higher)	Total
I believe that cryptocurrencies are a safe and reliable way to make payments online	Strongly disagree	8	23	31
	Slightly disagree	19	32	51
	Neutral	17	25	42
	Slightly agree	4	24	28
	Strongly agree	3	1	4
Total		51	105	156

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)	Point Probability
Pearson Chi-Square	9.872[a]	4	.043	.041		
Likelihood Ratio	10.267	4	.036	.044		
Fisher-Freeman-Halton Exact Test	9.793			.037		
Linear-by-Linear Association	.001[b]	1	.978	1.000	.520	.063
N of Valid Cases	156					

a. 2 cells (20.0%) have expected count less than 5. The minimum expected count is 1.31.

11.

I'm worried that criminals might use cryptocurrencies for illegal activities * Education groups

Crosstab

Count

		Education groups		
		Low (high school or lower)	High (bachelor's degree or higher)	Total
I'm worried that criminals might use cryptocurrencies for illegal activities	Strongly disagree	4	1	5
	Slightly disagree	6	10	16
	Neutral	12	18	30
	Slightly agree	15	40	55
	Strongly agree	14	36	50
Total		51	105	156

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)	Point Probability
Pearson Chi-Square	7.216[a]	4	.125	.123		
Likelihood Ratio	6.872	4	.143	.170		
Fisher-Freeman-Halton Exact Test	6.756			.137		
Linear-by-Linear Association	4.251[b]	1	.039	.042	.025	.008
N of Valid Cases	156					

a. 2 cells (20.0%) have expected count less than 5. The minimum expected count is 1.63.

12.

I think there are too few situations where cryptocurrencies can be used * Education groups

Crosstab

Count

		Education groups		
		Low (high school or lower)	High (bachelor's degree or higher)	Total
I think there are too few situations where cryptocurrencies can be used	Strongly disagree	1	6	7
	Slightly disagree	7	14	21
	Neutral	17	37	54
	Slightly agree	17	29	46
	Strongly agree	9	19	28
Total		51	105	156

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)	Point Probability
Pearson Chi-Square	1.502[a]	4	.826	.835		
Likelihood Ratio	1.662	4	.798	.813		
Fisher-Freeman-Halton Exact Test	1.348			.876		
Linear-by-Linear Association	.425[b]	1	.514	.526	.285	.052
N of Valid Cases	156					

a. 2 cells (20.0%) have expected count less than 5. The minimum expected count is 2.29.

13.

People in my social circle encourage the usage of cryptocurrencies * Education groups

Crosstab

Count

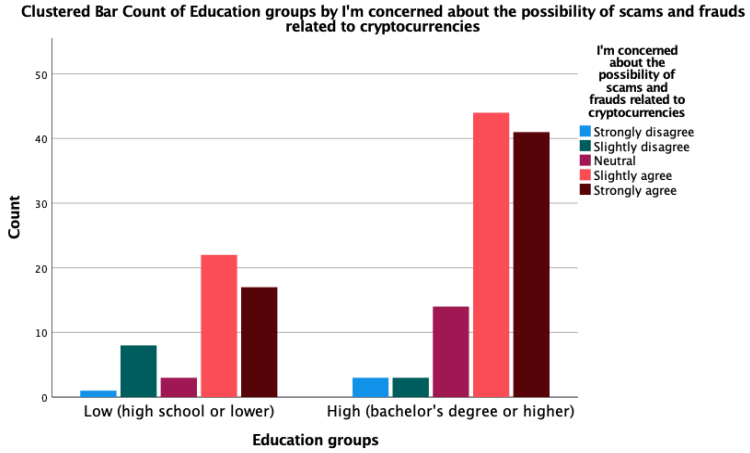
		Education groups		
		Low (high school or lower)	High (bachelor's degree or higher)	Total
People in my social circle encourage the usage of cryptocurrencies	Strongly disagree	25	50	75
	Slightly disagree	10	22	32
	Neutral	7	23	30
	Slightly agree	7	8	15
	Strongly agree	2	2	4
Total		51	105	156

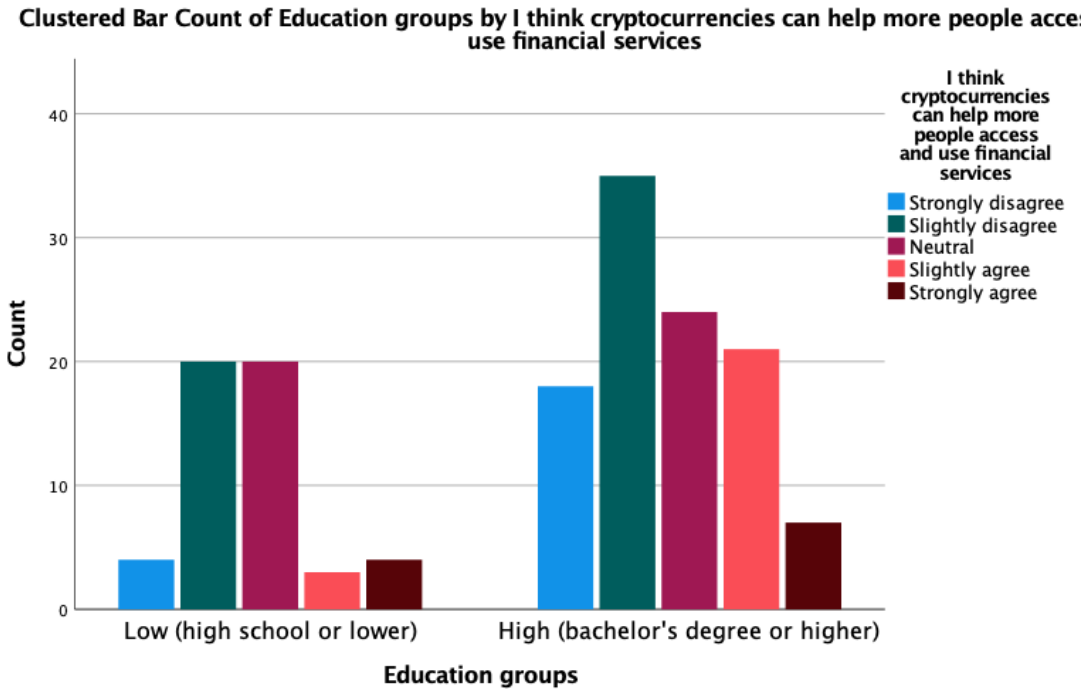
Chi-Square Tests

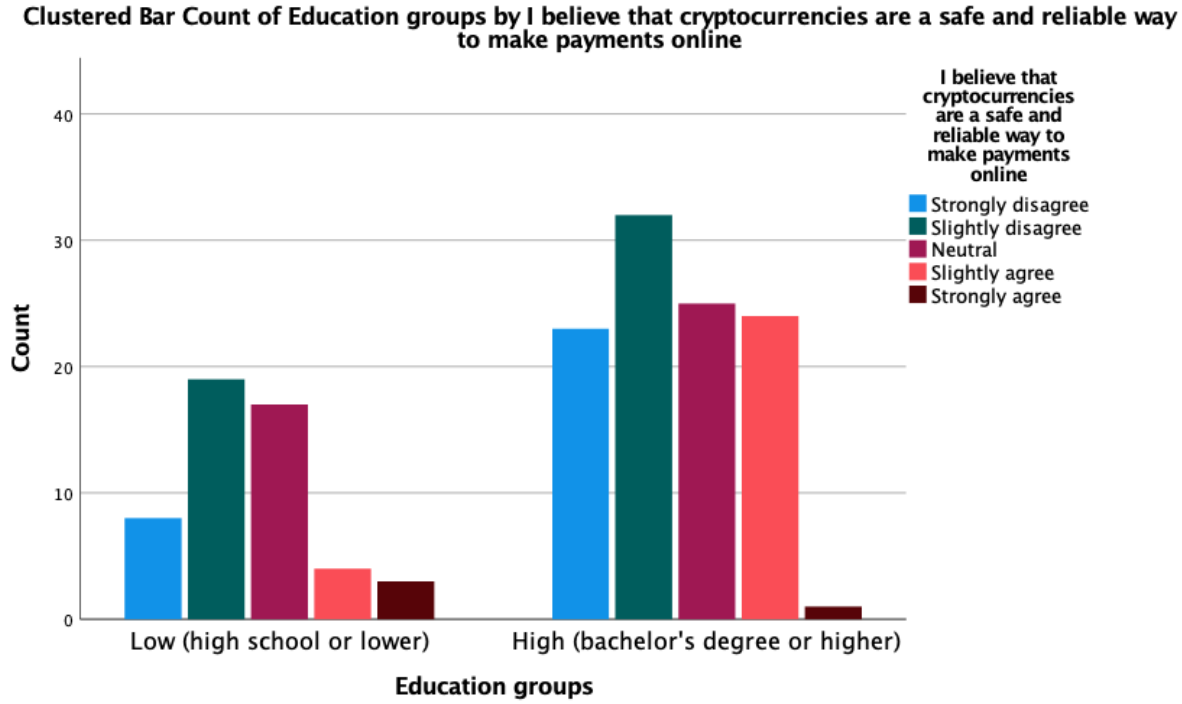
	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)	Point Probability
Pearson Chi-Square	3.114[a]	4	.539	.559		
Likelihood Ratio	3.081	4	.544	.614		
Fisher-Freeman-Halton Exact Test	3.317			.517		
Linear-by-Linear Association	.200[b]	1	.655	.709	.353	.053
N of Valid Cases	156					

a. 3 cells (30.0%) have expected count less than 5. The minimum expected count is 1.31.

Appendix H: visual representation statistically relevant relationships




Clustered Bar Count of Education groups by I think cryptocurrencies can help more people access and use financial services
I think cryptocurrencies can help more people access and use financial services
Strongly disagree
Slightly disagree
Neutral
Slightly agree
Strongly agree
Count
40
30
20
10
0
Low (high school or lower)
High (bachelor's degree or higher)
Education groups


Clustered Bar Count of Education groups by I believe that cryptocurrencies are a safe and reliable way to make payments online
I believe that cryptocurrencies are a safe and reliable way to make payments online
Strongly disagree
Slightly disagree
Neutral
Slightly agree
Strongly agree
Count
40
30
20
10
0
Low (high school or lower)
High (bachelor's degree or higher)
Education groups