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Do people have implicit attitudes towards age, and does this attitude correlate with investments in firms with younger CEOs?

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Thesis Paper by

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Abstract:

This research paper examines the relationship between implicit associations of age and investment preferences between two firms with differently aged CEOs. Data was gathered using a survey containing an Implicit Association Test, as well as 10 preference questions between a firm with young CEO and a firm with an old CEO. In total, 14 respondents showed significant implicit associations toward young people, however no evidence of any significant correlations between implicit associations and the average preference of all 10 pairs was found.

Introduction:

Technological developments in the equity market have allowed young investors to live out the Stock Exchange Trading Floor experience in the comfort of their beds. It's true, as shown by the 2021 GameStop stock price volatility, mainly fuelled by young retail investors trading fractional shares through online, commission-free brokers (The Guardian, 2021). The channels through which different age groups access financial markets is only one of the many aspects of how age and the perception of it influence financial decisions. In this paper, the relationship between financial decisions and age, whether of the investor or the company/person that the investor chooses to invest in, will be investigated.

Literature Review

Several research papers have already been published on age and investment decisions, most of which finding significant evidence for age of the respondent being an important factor in financial choices: research conducted by Misal in 2013 found that, among demographics, age of the respondents was the most important variable that impacted the respondent's investment decisions, while another paper by Wang and Hanna (1997) found that risk preference changes with age, with young people willing to accept higher-risk, "bet" like stock picks (Misal, 2013; Wang & Hanna, 1997).

Another important influence of age of respondents, advocated by academic literature, is on the leadership methods and decisions that CEOs take on behalf of their corporations. Prior academia has found competing theories for influence of age on CEO behavior: Taylor (1975) found little to no evidence to support the idea that older managers are "less facile information processors and decision makers". Later results from Hirshleifer and Thakor (1992) found that young CEOs are more risk averse due a lack of reputation, therefore higher potential punishment for poorly performing decisions; whereas Prendergast and Stole found the opposite in their "Impetuous youngsters and jaded old-timers: Acquiring a reputation for learning" paper: they developed a model which predicted that younger CEOs would be persuaded to signal their ability of running the company by aggressively investing and taking higher risks (Prendergast & Stole, 1996). Eventual research done by M. Serfling put both theories to test and found that CEO age is "negatively related to firm stock return volatility", while also finding that younger CEOs invest more in research and development compared to their elder counterparts (Serfling, 2014).

Besides CEOs, individual investor's decisions and risk preference are also correlated to their age. Unfortunately, the findings are also in conflict with one another: in their 2013 paper "Does the Investor's age influence their investment behaviour?", Charles and Kasilingam found that their sample of retail investors showed evidence of "significant associations" of age as an important demographic factor when assessing various investment decisions (Charles & Kasilingam, 2013). This is, once again, disputed by the "Factors affecting investment behaviour among young professionals" paper by Ansari and Moid, that found that their sample's "young professionals' investments are independent of age, gender and income" (Ansari & Moid, 2013).

What is, at least for now, missing from the literature, is how respondent preferences toward certain age groups can influence investment decisions. We can motivate the need for the answer to this topic by first reviewing current literature on stereotypes of age. First, a research paper written by Robert J. Shiller on the determinants of speculative asset prices has found that social dynamics are a key part of investment ideas spreading across investors, with a debate-like mechanism in use (Shiller, 2014). These social dynamics are prone to stereotyping age: Murphy and DeNisi's commentary on whether age stereotypes can influence personnel decisions argue that it is "widely believed" that the elderly conduct recruitment, managerial and corporate operations worse than their younger counterparts (Murphy & DeNisi, 2021). Another paper by Rosen and Jerdee found that , given the stereotypes at the time of writing, elder employees were discriminated against for their perceived physical as well as cognitive characteristics, while their managerial decisions were more heavily scrutinized (Rosen & Jerdee, 1976). In the same year, Rosen and Jerdee conducted another survey, now researching job-related stereotypes and found similar results: when asked to rate a 30- and 60-year-old man on 65 personal characteristics, respondents rated the elderly worker "lower on performance capacity and potential for development", but also rated the elderly worker higher on stability (Rosen & Jordee, 1976).

Research Question:

These findings brings us to this research paper's focus, which aims to find a relationship between age, age attitudes and investment ideas propagated in each age group. Therefore, the research question is proposed:

Do attitudes toward younger age groups correlate with investment decision in firms with younger CEOs?

This question will be answered with the help of two hypotheses:

H1: There is a significant implicit association towards young people.
H2: There is a significant positive correlation between implicit attitudes toward young people and preference to investment in companies with younger CEOs.

The answer to this research question will hopefully give insights into the relationship between the subconscious association of age and investments in firms with a young/old CEO. This paper specifically uses implicit association, rather than explicit association (such as directly asking the respondent how they perceive age), in order to reduce the social-desirability bias as much as possible (Krumpal,2011). More on this in the methodology section.

Relevance:

The results of the research are both socially and academically relevant, as well as interesting for governmental policies regarding public investment. Aforementioned articles expressed their respondent sample's stereotypes towards older people. On a similar note, scepticism surrounding disruptive technologies, such as the rise of non-physical banks through the use of fintech, is generally attributed to older, uninformed, or misinformed individuals (Gulamhuseinwala, Bull & Lewis, 2017). Similar sentiments of stagnation in innovation can be felt in the energy and specifically fossil fuel energy sector, a mature market characterized by a small number of high-market-share firms led by older men, which has only recently started diversifying and investing in research and development toward greener, renewable energies, even though academics have linked fossil fuel use with climate change and urged for decreased fossil fuel use for atleast two decades (Pickl, 2019; Wuebbles & Jain, 2001).

Academically, the paper builds on the current ideas in literature by incorporating age stereotypes or, more specifically, implicit bias in traditional age-investment questions. While similar in scope, the research hopes to spark interest and further deepen the conversation on innovation, implicit attitudes, stereotypes, and impact investing. Additionally, the research aims to further the reach of the rising field of behavioural finance by implementing currently researched biases in behavioural economics into existing financial models and techniques.

Methodology:

Survey:

To evaluate the hypothesis, and therefore answer the research question, a survey was created (which can be found in Appendix A) with the use of the Qualtrics software to gather the necessary data, after which the data was manually curated using Microsoft Excel and finally, empirically tested with the Stata statistical software. The survey was distributed via Internet social media websites as well as direct messages to close friends, fellow colleagues, and family members, starting from May and ending in August. The survey is divided in three parts: demographic questions, the Implicit Association Test module, and investment decision questions. The paper will now further elaborate on each part of the survey.

Demographic questions were asked for multiple reasons: to both check the representativeness of the sample as well as check for any relationships between specific demographic variables and implicit association or investment decisions. Respondents were asked to specify their age, gender identity, ethnicity, location (described as what location the respondent considers their home) and education (described as highest level of completed education). Other demographic variables, such as income, were omitted, due to the survey being primarily targeted toward students.

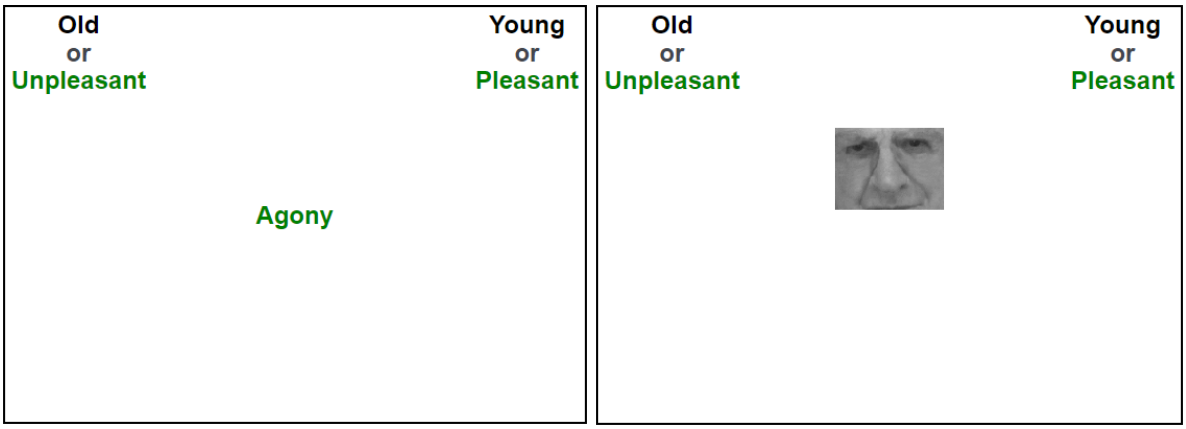
Implicit Association Test:

After demographics, the Implicit Association test was presented. The Implicit Association Test (IAT) is a method to measure the association between two target concepts with an attribute, otherwise known as an implicit attitude (Greenwald, McGhee & Schwartz, 1998). It does so by measuring the response time when associating the target concepts, or in this paper's case, young and old people, with an attribute, pleasant or unpleasant. We will now further explain how the IAT yields a metric to measure implicit association.

This paper used Carpenter et al.'s iatgen software to easily produce an IAT capable of being run in Qualtrics, as well as to analyze the respondents' results (Carpenter et al, 2019). The software asks the respondent to use their keyboard to categorize the target and attributes with their left hand using the "e" key, and the "i" key for the right hand. Unfortunately, the software does not allow mobile devices, which is considered a current limitation of iatgen. More on this in the limitations section.

The IAT itself has 7 blocks, meant to introduce the target concepts, the attribute, as well as the method of measuring response time to the respondent. Blocks 1 and 2 were used to introduce the target concepts and attributes, respectively, while block 3 was used to introduce the combinations between the target concepts and attributes. Each of the 3 blocks had 20 trials. Block 4 is double in length, therefore 40 trials, and is the first "Test" block that measures the response times. Block 5 is 20 trials in length and only shows the targets, but with their positions swapped, so if in the previous blocks the "Young" was used as the right-hand answer, it is now the left-hand answer. This swap is by design, to ensure that the results are not biased due to any learning or pairing order effect of the respondent. Block reintroduces the attributes, with the combinations reversed (If previously "Young" and "Pleasant" was the left-hand answer, now "Old" and "Pleasant" are used for the left hand answer). Block 7 once again uses the same combination as Block 6, but is double in length (40 trials). Below is a representation of the IAT and what respondents were shown. Across respondents, the initial positions of the target concepts and attributes were randomized, meaning that roughly 50% of respondents started with "Young" as their right-hand category in blocks 1 – 4 and roughly 25% of respondents had the "Young"/Pleasant" category in Blocks 3-4.

Figure 1: IAT showing the target concepts and the attributes.



The images used for young and old attributes, as well as the words used to describe the pleasant and unpleasant concepts were sourced from Project Implicit and Brian Noesk's projectimplicit.com website and is available in Appendix B (Nosek et al, 2007). One important note is that the images are in black and white, as well as cropped to only include the eyebrows, eyes, nose and upper lip. This is to ensure that no other aspects of a human's appearance, such as hair, skin colour, apparel and any worn accessories bias the responses in any way. Another important note is

that, generally, the combination of attribute and concept that can be faster associated in the mind of the respondent is called the “compatible” combination. Since this research paper was aimed to be completed by young university attendees/graduates, the “Young/Pleasant” was used as the compatible combination.

To ensure valid responses, the software includes several errors and cut-off points, which will be discussed now. As previously mentioned, respondents could only complete the survey if a personal computer is used, regardless of operating system. If a respondent were to incorrectly assign an image/picture, a red “X” would appear for a brief time, after which the respondents could correctly categorize the attributes and targets. Furthermore, the software automatically culls trials and respondents based on cut-off points. Individual trials are deleted if they have over 10,000 ms response times, and whole respondents are deleted if they have 10% of trials with responses under 300ms. The aforementioned red “X” also incurs a time penalty for the respondents, as the respondents need to adjust their answer.

Using the response times gathered with the use of the IAT, a d-score is computed to measure significance of the implicit bias. The interpretation of the d-score is, given that a respondent has an implicit bias towards a certain group, it would be easier for them to assign pleasant/good attributes for that group, therefore the respondent would be faster in categorizing the concept with the attribute. The d-score, therefore, computes the relative difference between response times for the compatible combinations and the incompatible combinations into a measurable metric of the implicit bias. The formula for the d-score is given as follows:

Figure 2: D-Score formula

$$d-score = \frac{1}{2} * \frac{(\,Average(Response\ Time_{Block\ 6}) - Average(Response\ Time_{Block\ 3}))}{(Standard\ Deviation_{Block\ 6\ \&\ Block\ 3}\,)} + \frac{1}{2} * \frac{(\,Average(Response\ Time_{Block\ 7}) - Average(Response\ Time_{Block\ 4}))}{(Standard\ Deviation_{Block\ 7\ \&\ Block\ 4}\,)}$$

A positive d-score implies a faster response time in categorizing compatible concepts and attributes, therefore a higher implicit bias toward the concept (in our example, a faster response time in associating young with pleasant, therefore a higher implicit bias toward young people). A negative d-score implies a faster response for categorizing non-compatible concepts and attributes (therefore, a higher implicit bias towards old people), while a d-score of 0 implies no difference in speed and therefore equal association. This d-score will be used to test the hypotheses, but it may also be

interesting to check the magnitude of the implicit bias. This can be done with the effect of Cohen's d metric, given as follows:

$$Cohen's\ D = \frac{Average_{d-score}}{Standard\ Deviation_{d-score}}$$

The implicit bias is said to be small, moderate and large when Cohen's d is 0.2, 0.5 and 0.8, respectively.

Explicit bias can also be tested for by asking the respondent directly how they associate young and old people. Nevertheless, it was ultimately decided against it, as research done by Krumpal found that when asked directly, the respondent suffers from social-desirability bias and would therefore choose to respond in a way that is socially acceptable rather than present their true opinion. (Krumpal, 2011). Furthermore, Greenwald and Nosek's "update" on the IAT found that there is little correlation between explicit and implicit measures for attitudes (Greenwald & Nosek, 2001). Another paper by Greenwald et al. found that low correlation between explicit and implicit bias usually stems from 3 reasons: respondents do not want to show their true preference in politically-sensitive questions, "poor introspective" access to the respondents' attitudes, and when "attitudes are so homogenous in the population that low correlations result from restricted range" of the implicit measure (Greenwald, McGhee & Schwartz, 1998). This research paper, therefore, will only use implicit bias in analysis.

Investment Decisions:

The last part of the survey included the investment decision questions. The purpose of this module is to get a representation of the respondent preference between Companies with different CEO ages. Participants were shown 10 separate pairs of firms, their CEO's name, picture, age and tenure, the firm's name, the firm's industry, its Fortune 500 rank, and its last recorded revenue (2021). Firm A always had the younger CEO, while firm B always had the older CEO. The pictures were sourced form Google Images, while all the other information was sourced from Fortune's Top 10 youngest and oldest CEOs web pages (Berger, 2022; Their, 2022). The order and combination of the companies were according to their list in the aforementioned websites, so the company with the oldest CEO was assigned together with the company with the youngest CEO. Unfortunately, the companies' varied in their industries, therefore it was decided against matching companies on their characteristics, which is considered a limitation of this research. Afterward, the respondents were asked how likely they are to invest in Firm A or Firm B. To avoid the difficulty of asking respondents to value the price of the

company, they will only be asked to state their preference between the firms with young and old CEOs.

To do so, a modified 11-step Likert scale and a slider representing integers from -5 to +5 was used: respondents could answer that they were more likely to invest in Firm A by answering with a -5, slight preference toward firm A by answering between a -4 and a -1, no preferences between Firm A and B with a 0, and more likely to invest in Firm B by answering between a 1 to 4, with the highest preference toward firm B being assigned a 5. These specific numbers were used to assign a true neutral preference with a zero, as well as to get a more delicate measure of preference and avoid the respondents giving a binary answer.

Finally, respondents were asked to rank from 1 to 7 (which was, during analysis, relabeled from -3 to +3 to maintain consistency across metrics and to avoid confusion in analysis) all of the firm's characteristics, from most important in influencing their preferences between the firms to the least important, and were asked to optionally input if there were any unspecified factors that influenced their decisions.

With the survey now explained, the methods to test the hypotheses acquired will now be discussed.

Analysis:

The IAT's d-score will be tested if it significantly differs from zero, and combined with the computed Cohen's D, we will measure the magnitude of the implicit bias, therefore testing the first hypothesis.

Using the investment questions, an average preference for all 10 pairs combined, as well as an average preference for each separate pair will be computed, with a negative number implying an average preference toward firms with younger CEO's and a positive number implying an average preference toward firms with older CEO's. An analysis on the average influence of each separate factor will also be conducted, as well as implementing dummy variables for the unspecified factors that the respondents answered as also influencing their decision.

The d-score, firm preferences along with the rest of the demographics will be used in several regressions, with the average (overall) preference as the dependent variable, the d-score as the independent variable, and each regression increasing in the control variables used, to test the second hypothesis. It is important to mention that multiple factors affect investment decisions, as previously mentioned. This said, age and age attitudes are arguably far less influential on investment decisions compared to, for example, a fundamental analysis of the firm. This paper, therefore, makes no attempt to causally explain whether age attitudes influence investment decisions. This is considered to be the key limitation of the research, as the conditions needed to influence investment decisions in a lab experiment would make the experiment both externally invalid, and exorbitantly expensive. Nevertheless, the findings of this research can be a foundation for future research in the causal mechanisms of behavioral finance.

Data and Results:

The survey recorded 26 responses; however, further data curation was needed. Out of the 26 responses, one did not consent to their data being used for the study, 10 opened the survey but did not start it, and one respondent did not finish the survey, yielding only 14 valid responses. The demographic questions summary can be seen in the table below. Overall, the sample does not appear to be sufficiently representative, as almost 80% of respondents were male, more than 70% were white and the average age was 22.4 years. Keeping in mind that external validity is almost certainly violated (more about this in the "Limitations" section), we can continue with our analysis.

Table 1.1: Categorical Demographic variables

Demographic	Frequency	Percent
Gender		
Female	3	21.43
Male	11	78.57
Race		
Asian	3	21.43
Black	1	7.14
White	10	71.43
Location		
Africa	1	7.14
Eastern Europe	6	42.86
North America	1	7.14
South Asia	1	7.14
Western Europe	5	35.71
Education		
Bachelor's Degree	8	57.14
College	2	14.29
High School	3	21.43
Master's Degree	1	7.14

Table 1.2: Continuous demographic variables.

Demographic	***Observations***	***Mean***	***St. Dev.***	***Min***	***Max***
age	14	22.35714	1.392681	20	26

The IAT module yielded an average d-score of 0.5514, with a Standard Deviation of 0.3755. With the data now collected, we can test our hypotheses and in turn, answer our research question. For hypothesis 1, a t-test is used to test whether the d-score significantly differs from zero. This test returned a t-value of 5.4944, with a corresponding p-value of 0.0001. We can therefore conclude that there indeed is a significant implicit preference toward young people in our sample, therefore answering our first hypothesis. This fact is also reflected by Cohen's D metric, which in our case is 1.4684, therefore indicating that the magnitude of the preference is large.

Moving on to the second hypothesis, we conducted multiple tests to find out whether a relationship between age association and investment preferences exists. First, a t-test on the average answer for all 10 investment decision questions was conducted to check if there is a significant preference toward firms with younger or older CEOs. Furthermore, separate t-tests were also conducted on each single question (therefore each pair of firms) in the investment decision part. The results can be found in Table 2.

Table 2: Individual pair and average pair preference summary statistics, with t-tests against a mean of 0.

Variable	*Obs*	*Mean*	*Standard Error*	*Standard Deviation*	*95% Confidence intervals*		*T-score*	*P-value*
Average Preference	14	-0.5000	0.3737	1.3984	-1.3074	0.3074	-1.3379	0.2039
Pref Pair 1	14	-0.7143	0.8479	3.1727	-2.5461	1.1176	-0.8424	0.4148
Pref Pair 2	14	0.7857	0.7996	2.9917	-0.9417	2.5131	0.9827	0.3437
Pref Pair 3	14	-1.2143	0.7124	2.6654	-2.7532	0.3247	-1.7046	0.1120
Pref Pair 4	14	-0.7857	0.8199	3.0679	-2.5571	0.9856	-0.9583	0.3554
Pref Pair 5	14	-0.3571	0.9294	3.4776	-2.3650	1.6507	-0.3843	0.7070
Pref Pair 6	14	-2.9286	0.7447	2.7863	-4.5374	-1.3198	-3.9326	0.0017***
Pref Pair 7	14	-0.3571	0.8555	3.2011	-2.2054	1.4911	-0.4174	0.6832
Pref Pair 8	14	-0.7857	0.9269	3.4681	-2.7881	1.2167	-0.8477	0.4119
Pref Pair 9	14	1.0714	0.8674	3.2455	-0.8024	2.9453	1.2352	0.2386
Pref Pair 10	14	0.2857	1.0400	3.8914	-1.9611	2.5325	0.2747	0.7878

*Significance at critical levels 0.10, 0.05 and 0.01 is labeled as *, **, and ***, respectively.*

The mean for average preference across all pairs is -0.5 with a standard deviation of 1.3984, and testing whether the average preference significantly differs from 0 computes a t score of -1.3379 with a corresponding p-value of 0.2039. We therefore cannot conclude that there is a preference toward firms with young investors. However, when analyzing each pair separately and conducting the same tests, we find one pair (pair 6), which had a significant preference toward the firm with the younger CEO. The p-value of 0.0017 is significant at all critical values. One explanation for this phenomenon is due to the fact that this is the pair containing the only female CEO out of all 20 CEO's presented in all questions. This is further argued for by the ranks of the influencing factors. Below is a table of the factor ranking summary statistics.

Table 3: Influence factor rankings Summary statistics.

Variable	*Obs*	*Mean*	*Standard Deviation*	*Min*	*Max*
Industry	14	1.928571	1.54244	-1	3
Revenue	14	1.214286	1.528125	-2	3
Rank	14	0.857143	1.610406	-3	3
Company	14	-0.35714	1.499084	-2	2
Age	14	-0.5	1.82925	-3	3
Tenure	14	-0.5	1.506397	-3	2
Name	14	-2.64286	0.633324	-3	-1

There are two things worth noting here: first is that the respondents were asked to rank the factors from 1 (most important) to 7 (least important), which was later relabeled to -3 (least important) and +3 (most important), therefore a negative number means lower importance in evaluating preferences. On average, respondents ranked the industry as being the most important factor while the company name as the least important factor when deciding preferences.

Second thing worth noting is that "gender" was not included in the rankings due to only one female CEO being present in the questions. However, respondents were also asked whether outside factors influenced their decisions and were asked to state these factors. Three respondents answered that Gender was a strongly influencing factor, one respondent answered that CEO/company reputation mattered to them, and the remaining respondents chose not to answer the question. This was implemented in the analysis by using a binary dummy variable ("Gender Influence"), with a 1 indicating that the respondent's preference for the firm was influenced by the gender of the CEO. Similarly, for respondents who stated that age was the most important factor when stating preferences between the firms, a binary variable ("Age Influence"), was also created, to test whether it significantly affects average preference.

With the discrepancy explained in the statistically significant pair preference, analysis can continue. Table 2 shows that, on average, there is no significant preference toward firms with younger CEOs, and on pair-level there is only one significant association toward the firm with young CEO, but as discussed, this effect may be confounded with the preference for gender. When asked, respondents in our sample ranked CEO Age, on average, as the 5^{th} most important factor out of the 7 proposed factors, with Company Industry, Company Revenue and Company Rank being the top 3 factors

influencing their preferences. To finalize the analysis and explain our results, several ordinary least squares (OLS) regressions were run. As previously mentioned, these regressions increased in the control variables used. The results can be seen below in Table 4.

Table 4: Several OLS regression models of d-score on Average Preference.

Ind. Variable	Model 1 ***Coefficient (Std. Error)***	Model 2 ***Coefficient (Std. Error)***	Model 3 ***Coefficient (Std. Error)***
D-Score	-0.5214 (0.7294)	-0.2542 (2.2325)	0.04645 (1.7356)
Age Influence			-1.4927 (2.3601)
Gender Influence			4.91442 (2.6961)
Eastern Europe		-0.3958 (1.8870)	1.19021 (2.4872)
North America		0.75044 (9.7164)	15.0159 (12.918)
South Asia		-2.2623 (5.6706)	-8.3408 (6.5515)
Asian		0.73453 (2.1746)	1.74237 (2.0659)
Female		-2.4614 (2.6500)	-3.6307 (2.8705)
Age		-0.7065 (2.0821)	-3.8823 (2.5967)
Africa		4.58576 (7.6964)	8.76992 (9.1407)
Bachelor's Degree		-1.0429 (2.3987)	-0.7830 (3.1843)
High School		-2.1145 (1.4718)	-1.5766 (2.3915)
Constant	-0.2124 (0.5712	16.8065 (45.081)	85.0094 (54.849
Model's R^2	0.0196	0.7211	0.9011

*"Western Europe" location, "Black" and "White" ethnicities, "College" and "Master's Degree" education variables have been omitted due to multicollinearity. Model 1 regresses d-score on average preference. Model 2 includes demographic variables as control variables. Model 3 includes Age influence and Gender influence as control variables. Standard errors are presented in parantheses. Significance at critical levels 0.10, 0.05 and 0.01 is labeled as *, **, and ***, respectively.*

Even when controlling for demographics and influential factors of age and gender, d-score is not significantly correlated to preference. We therefore cannot reject that d-score and average preferences are uncorrelated.

Conclusion, Limitations & Discussions:

Conclusion:

To summarize: This paper questions whether implicit associations of age are correlated with decisions to invest in companies with younger CEOs. Academic literature has found various, conflicting results to whether age is a significant influencing factor on investments, both in CEOs as well as individual investors. To answer this question, two hypotheses were proposed:

H1: There is a significant implicit association towards young people.
H2: There is a significant positive correlation between implicit attitudes toward young people and preference to investment in companies with younger CEOs.

In order to test the hypotheses and in turn answer the research question, a survey was created and consisted of 3 parts: demographics, implicit association test (IAT) module, and investment decision questions. The IAT measured the implicit association of age by asking respondents to categorize 2 age groups (Young and Old) with alternating concepts (Pleasant and Unpleasant). The difference in response times between categorizing young with pleasant and old with pleasant is computed as the implicit association of age and is measured by the d-score, as the easier and faster a respondent can group an age group and a positive characteristic together, the higher their implicit preference toward that age group. Here, the first hypothesis was tested, and the results indeed show that there is a significant implicit association towards young people.

The third and final part of the survey asked respondents to state their strength of preference between investing in a company with a young CEO and another company with an older CEO. In total, 10 questions were asked. Finally, respondents were asked to rank the factors that influenced their decisions and were also asked to state if and which outside factors were also of influence. With the gathered data, the second hypothesis was answered. The results found that average preferences were not statistically significant and when checking the pair-level preference, results show only one significant pair which exhibits preference toward the younger CEO company. However, this result may be confounded by the fact that the young CEO was the only female CEO presented in the survey and multiple respondents stated that gender was also an important factor in deciding which company they would rather invest in. Furthermore, when asked to rank the factors that influenced their decision, respondents ranked age, on average, as the 5^{th} (out of 7) most important factor.

To formally test and find a definitive answer to our second hypothesis, a regression of d-score on average preference was ran, including demographic variables as controls, which yielded no statistically significant coefficients. We therefore cannot conclude that there is a relationship between implicit age association and preference toward companies with young CEOs.

We can now answer our research question. While implicit preference towards young people exists in our sample, we found no statistically significant correlation between implicit age association and preference toward companies with young CEO. We found that respondents do not rank the company CEO's age as influential as the financial and operational characteristics of the company itself. We can also discuss how this differs from our expected results. Given the target demographic that the survey was targeted towards (University Bachelor students), we expected the implicit association of age to bias towards young people, and we also expected respondents to choose companies with younger CEOs. The former expectation was met, however the response to the latter was surprising. We speculate that respondents acknowledge that companies with younger CEOs are of a different, relatively unproved nature compared to their counterparts, such as Coinbase's cryptocurrency exchange versus Oil and Pipeline companies, or a software employment service provider versus Blackstone's $ 880bn assets under management empire. Nevertheless, to bridge the gap from speculation to empirically tested facts, further research is needed. This will be elaborated in the discussion section.

Limitations & Discussion:

Unfortunately, this research suffered from several major limitations.

First and foremost, due to the small sample size, external validity is violated and, therefore, there can be no inferences of any actual relationship between implicit bias of age and investment decisions in the real world. Furthermore, many responses were not fully completed and were deleted, leading to a drastic decrease in the amount of valid responses.

Another similar limitation is that the iatgen's software only works on personal computers due to the need to have a keyboard. Mobile devices are, at the time of writing, unsupported, therefore when respondents enter the website, they are promptly told that the survey cannot be completed on their device. Due to this incompatibility, a majority of potential respondents were no longer interested in participating. These two limitations could be overcome by using financial incentives, but this would

prove to be expensive, as well as it could attract respondents that do not seek to answer truthfully and only desire the reward for participation, thus biasing the results.

Another limitation is the difficult decision to assess the preference between two companies. As previously mentioned, age of the CEO is a far less important company characteristic that is considered when other characteristics of the firm, such as industry or revenue/profit margin, are given to the respondent. In an ideal case, companies should only differ in their CEO age. However, given the difference in industries that young and old CEOs compete in, it is difficult to get a sufficiently large "all else being equal" set of companies to present to the respondent.

While we do agree that these factors limited our findings, we also think that this research paper may be a stepping stone toward related research topics. Given that preference for the company with the single female CEO was the only statistically significant preference and that multiple respondents stated that gender is also an important factor, further research can be done on implicit association of age and investment in female-led companies. Another potentially interesting topic that our paper can spark debate on is the perception of the industries of the companies that younger CEOs choose to lead. Ojala's 2012 paper titled "Hope and climate change: the importance of hope for environmental engagement among young people" shows that even though the young generation is "most likely to suffer the negative consequences of climate change", they are "especially important to include in societal deliberations about this issue", and another paper by Sulich et al. shows more young people using greener technologies and "around 15% of young people find their first employment in the green jobs sector"(Ojala, 2012; Sulich, Rutkowska & Popławski , 2020). This may explain why CEOs of oil and pipeline companies are seasoned elders, who come from a generation and era whose economic growth was propelled by the use of combustible energy, while the younger generation is now starting to understand and feel the consequences of unbounded pollution and are leading the push toward greener energy and manufacturing.

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Appendices:

Appendix A: The Survey

Hello and welcome to my survey on How implicit associations of age are correlated with investment decisions!

Age is one of the deciding demographic variables that influence investment decisions. However, little research has been on how attitudes on age, whether good or bad, influence investment decisions. With this survey, we would like to gauge the actual level of subconscious attitudes toward race and test if it is correlated with investment decisions.

The survey is expected to take around 5-10 minutes of your time. The survey is required to be filled on a computer/laptop, so unfortunately mobile devices are not supported.

You will be asked a few demographic questions, then an Implicit Association Test (IAT) will be presented, and then you will be asked to rate your preferred investment between 2 companies. More information will be given before each module of the survey.

To comply with the GDPR, the data we collect is anonymized and cannot be traced to you. The data collected is also only used for the purpose of this experiment, and therefore for my academic research. By continuing with the survey, you agree with the conditions stated above.

- ◯ I consent
- ◯ I do not consent

Next

What is your age?

What gender do you identify as?

- Female
- Male
- Other/Prefer not to say

Please specify your ethnicity.

- White
- Black
- Mixed
- Asian
- Other

What region do you consider as your home?

- North America
- South America
- Western Europe
- Eastern Europe
- Africa
- North Asia
- South Asia
- Middle East
- Australia

What is the highest degree or level of education that you have completed?

- Some high school
- High school
- College
- Bachelor's Degree
- Master's Degree
- Doctorate Degree
- Other:

>>

Young **Old**

+

Instructions: Place your left and right index fingers on the E and I keys. At the top of the screen are 2 categories. In the task, words and/or images appear in the middle of the screen.

When the word/image belongs to the category on the left, press the **E** key as fast as you can. When it belongs to the category on the right, press the **I** key as fast as you can. If you make an error, a red **X** will appear. Correct errors by hitting the other key.

Please try to go as *fast as you can* while making as few errors as possible.

When you are ready, please press the [Space] bar to begin.

Part 1 of 7

Old **Young**

+

Notice the categories from before have switched sides. Please practice this new configuration now. Remember to try to go as *fast as you can* while making as few errors as possible. Correct errors by hitting the other key.

When you are ready, please press the [Space] bar to begin.

Part 5 of 7

You will now be shown 10 pairs of firms.

You will also be given some information for each company:
CEO name
CEO age
Company Name
Industry
Fortune 500 Rank
CEO tenure
Revenue

You will be asked to rate which firm you would prefer to invest in, on a scale of -5 (Firm A) to 0 (no preference) +5 (Firm B).

>>

Firm A:
CEO Name: Summit Singh
CEO Age: 42
CEO tenure: 4 years
Company: Chewy
Industry: Internet Services and Retailing
Fortune 500 Rank: 394
Revenue: $ 8.9 billion

Firm B:
CEO Name: John F. Barett
CEO Age: 72
CEO tenure: 28.4 years
Company: Western & Southern Financial Group
Industry: Insurance: Life & Health
Fortune 500 Rank: 372
Revenue: $ 9.4 billion

How would you rate your preference of investment between these firms?

-5 : You strongly prefer to invest in Firm A.
0 : You have no preference toward either firm.
+5 : You strongly prefer to invest in Firm B.

-5 -4 -3 -2 -1 0 1 2 3 4 5

preference

>>

Firm A:
CEO Name: Sarah M. London
CEO Age: 41
CEO tenure: 2 months
Company: Centene
Industry: Healthcare: Insurance and Managed Care
Fortune 500 Rank: 26
Revenue:$ 125.9 billion

Firm B:
CEO Name: William T. Dillard II
CEO Age: 76
CEO tenure: 24.1
Company: Dillard's
Industry: General Merchandisers
Fortune 500 Rank: 488
Revenue: $ 6.6 billion

How would you rate your preference of investment between these firms?

-5 : You strongly prefer to invest in Firm A.
0 : You have no preference toward either firm.
+5 : You strongly prefer to invest in Firm B.

-5 -4 -3 -2 -1 0 1 2 3 4 5

preference

>>

Firm A:
CEO Name:Hassane S. El-Khoury
CEO Age: 41
CEO tenure: 1.5 years
Company: ON Semiconductor
Industry: Semiconductors and Other Electronic Components
Fortune 500 Rank: 483
Revenue: $ 6.7 billion

Firm B:
CEO Name:Richard C. Adkerson
CEO Age: 74
CEO tenure: 18.5 years
Company: Freeport-McMoRan
Industry: Mining & Crude Oil Production
Fortune 500 Rank: 157
Revenue: $ 22.8 billion

How would you rate your preference of investment between these firms?

-5 : You strongly prefer to invest in Firm A.
0 : You have no preference toward either firm.
+5 : You strongly prefer to invest in Firm B.

-5 -4 -3 -2 -1 0 1 2 3 4 5

preference

>>

Firm A:
CEO Name: Brian Armstrong
CEO Age: 39
CEO tenure: 10 years
Company: Coinbase Global
Industry: Securities
Fortune 500 Rank: 437
Revenue: 7.8 bil

Firm B:
CEO Name: Roger S. Penske
CEO Age: 84
CEO tenure: 23.1 years
Company: Enterprise Products Partners
Industry: Pipelines
Fortune 500 Rank: 89
Revenue: 40.8 bil

How would you rate your preference of investment between these firms?

-5 : You strongly prefer to invest in Firm A.
0 : You have no preference toward either firm.
+5 : You strongly prefer to invest in Firm B.

-5 -4 -3 -2 -1 0 1 2 3 4 5

preference

>>

Firm A:
CEO Name: Eric Wu
CEO Age: 39
CEO tenure: 8 years
Company :Opendoor Technologies
Industry: Internet Services and Retailing
Fortune 500 Rank: 425
Revenue: $ 8 billion

Firm B:
CEO Name: Seifi Ghasemi
CEO Age: 77
CEO tenure: 7.9 years
Company: Air Products & Chemicals
Industry: Chemicals
Fortune 500 Rank: 350
Revenue: $ 10.3 billion

How would you rate your preference of investment between these firms?

-5 : You strongly prefer to invest in Firm A.
0 : You have no preference toward either firm.
+5 : You strongly prefer to invest in Firm B.

-5 -4 -3 -2 -1 0 1 2 3 4 5

preference

>>

Firm A:
CEO Name: Ernest C. Garcia
CEO Age: 40
CEO tenure: 11 years
Company: Carvana
Industry: Automotive retailing + Services
Fortune 500 Rank: 290
Revenue: $ 12.8 billion

Firm B:
CEO Name: A. James Teague
CEO Age: 76
CEO tenure: 6.4 years
Company: Enterprise Products Partners
Industry: Pipelines
Fortune 500 Rank: 89
Revenue: 40.8 bil

How would you rate your preference of investment between these firms?

-5 : You strongly prefer to invest in Firm A.
0 : You have no preference toward either firm.
+5 : You strongly prefer to invest in Firm B.

-5 -4 -3 -2 -1 0 1 2 3 4 5

preference

>>

Firm A:
CEO Name: Bret Taylor
CEO Age: 41
CEO tenure: 6 months
Company: Salesforce
Industry: Computer Software
Fortune 500 Rank: 136
Revenue: $ 26.4 billion

Firm B:
CEO Name: Stephen A. Schwarzman
CEO Age: 74
CEO tenure: 15.2 years
Company: Blackstone
Industry: Diversified Financials (Asset Management)
Fortune 500 Rank: 159
Revenue: $ 22.5 billion

How would you rate your preference of investment between these firms?

-5 : You strongly prefer to invest in Firm A.
0 : You have no preference toward either firm.
+5 : You strongly prefer to invest in Firm B.

-5 -4 -3 -2 -1 0 1 2 3 4 5

preference

>>

Firm A:
CEO Name: Matthew J. Meloy
CEO Age: 43
CEO tenure: 2 years
Company: Targa Resources
Industry: Pipelines
Fortune 500 Rank: 216
Revenue: $ 16.9 billion

Firm B:
CEO Name: Stanley M. Bergman
CEO Age: 71
CEO tenure: 33.4 years
Company: Henry Schein
Industry: Wholesalers: Health Care
Fortune 500 Rank: 299
Revenue: $ 12.4 billion

How would you rate your preference of investment between these firms?

-5 : You strongly prefer to invest in Firm A.
0 : You have no preference toward either firm.
+5 : You strongly prefer to invest in Firm B.

-5 -4 -3 -2 -1 0 1 2 3 4 5

preference

>>

Firm A:
CEO Name: Mark Zuckerberg
CEO Age: 37
CEO tenure: 18
Company: Meta Platforms (Previously Facebook)
Industry: Internet services and Retailing
Fortune 500 Rank: 27
Revenue: 117.9 bil

Firm B:
CEO Name: Warren E. Buffet
CEO Age: 91
CEO tenure: 57.1 years
Company: Berkshire Hathaway
Industry: Insurance: Property and Casualty (Stock)
Fortune 500 Rank: 7
Revenue: 276 bil

How would you rate your preference of investment between these firms?

-5 : You strongly prefer to invest in Firm A.
0 : You have no preference toward either firm.
+5 : You strongly prefer to invest in Firm B.

-5 -4 -3 -2 -1 0 1 2 3 4 5

preference

>>

Firm A:
CEO Name:Robert L. Reffkin
CEO Age: 42
CEO tenure: 9 years
Company: Compass
Industry: Internet Services and Retailing
Fortune 500 Rank: 495
Revenue: $ 6.4 billion

Firm B:
CEO Name: Albert Yuan Chao
CEO Age: 71
CEO tenure: 17.9 years
Company: Westlake
Industry: Chemicals
Fortune 500 Rank: 320
Revenue: $ 11.8 billion

How would you rate your preference of investment between these firms?

-5 : You strongly prefer to invest in Firm A.
0 : You have no preference toward either firm.
+5 : You strongly prefer to invest in Firm B.

-5 -4 -3 -2 -1 0 1 2 3 4 5

preference

>>

Please rank the characteristics in determining which companies you have preferred to invest in:

1. CEO Age
2. CEO Name
3. CEO Tenure
4. Company
5. Industry
6. Fortune 500 Rank
7. Revenue

If an unlisted factor influenced your decision, please state it here:

>>

Thank you for taking the time to answer my survey! Your contribution to my research is greatly appreciated. There are no more questions after this.

If you would like a copy of the report (when it will be done), do not hesitate to ask!

>>

Appendix B: IAT Stimuli:

Pleasant:

- Peace
- Happy
- Love
- Friend
- Wonderful
- Joy
- Pleasure
- Laughter

Unpleasant:

- Horrible
- Evil
- War
- Failure
- Terrible
- Agony
- Nasty
- Awful

Young:

Old: