A Comparison of SONA and MTurk for Cybersecurity Surveys

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ABSTRACT

For almost every online account, people are required to create a password to protect their information online. Since many people have many accounts, they tend to create insecure passwords and re-use passwords. These insecure passwords are often easy to guess, which can lead to compromised data. It is well-known that every person has a different personality type, which can be determined using personality models such as Big Five and True Colors. This research examines if there is a link between personality type and password security among a variety of participants in two groups of participants: SONA and MTurk. Each participant in both surveys answered questions based on password security and their personality type. Our results show that participants in the MTurk survey were more likely to choose a strong password and to exhibit better security behaviors and knowledge than participants in the SONA survey. This is mostly attributed to the age difference. However, the distribution of the results was similar for both MTurk and SONA. Future surveys on cybersecurity should include both types of demographics for a more generalizable result.

CCS CONCEPTS

• **Security and privacy** → **Social aspects of security and privacy**; • **Social and professional topics** → *User characteristics*.

KEYWORDS

Survey, Password Strength, Personality, MTurk, SONA

1 INTRODUCTION

Many universities have a pool of students enrolled in introductory psychology courses. These students are asked to complete some surveys either as a requirement for the class or for extra credit. Each survey tells the students how much credit they will be receiving. This pool is managed by a system called SONA. Since these are actual students enrolled in courses, the SONA survey is generally reliable as the students will usually complete the survey correctly. However, the age of the participants in the survey will be the typical

undergraduate student age group, which is between 18 to 21 years old. In our SONA online survey, 90% of participants were between 18 and 21 years old and 10% of participants were older than 21.

Online surveys can also be administered through crowdsourcing platforms such as Amazon Mechanical Turk (MTurk) [9]. Participants in these online surveys are compensated after they complete a survey, usually a couple of dollars depending how time-consuming the survey is. A wider and more diverse group of participants can be reached through these crowdsourcing platforms. In our data collection, 23% of participants were in their 20s, 39% in their 30s, 19% in their 40s, 11% in their 50s, 7% in their 60s, and 1% in their 70s. The youngest participant was 20 years old, and the oldest participant was 73 years old. However, inaccurate data is a potential issue. Many participants will employ bots to automatically complete the online surveys and still get compensated. These bots could select random answers to questions or be more advanced and attempt to understand the questions using natural language processing. Thus, the reliability of these surveys is not as high as SONA.

In this research, the same online survey is distributed to both SONA and MTurk. One of the goals of this research is to determine if there is a relationship between the personality self-schema of participants and these participants' password usage and management. The second goal is to determine if there is a difference in SONA and MTurk responses, which would lead to determining whether both surveys are needed. Each participant received a message about what constitutes a strong password. The goal of the messaging is to determine if a training message will help in improving password security behavior. The motivation for this research is that if a correlation can be found between certain personality type(s) or self-schema(s) and insecure behaviors, then more targeted cybersecurity training can be performed on such people.

From our results, we found that the SONA and MTurk surveys produced similar outcomes. The differences are attributed mostly to the age range between SONA participants and MTurk participants. Due to this difference, MTurk participants were more likely to create a strong password than SONA participants.

The contributions of this paper are as follows: 1)The differences in SONA and MTurk are due to age difference in the two groups. Combined together, both surveys could be generalized to the entire population; 2) Age affects the creation of stronger passwords, higher security knowledge and behaviors; 3) There is a slight correlation between personality self schemas and creation of a strong password; 4) Better security knowledge tends to lead to creation of stronger passwords. Although this is expected, some highly knowledgeable participants also created weak passwords.

2 RELATED WORK

True Colors is a model that assigns individuals with a color to represent their primary personality self schema. True Colors utilizes four different colors to represent primary self-schemas: orange, gold,

green, and blue. People who are comfortable with taking risks and are more action-oriented tend to identify as "oranges". People who value structure and punctuality in their lives tend to identify as "golds". People who think outside of the box and enjoy problem solving tend to identify as "greens". People who value sincerity and collaboration to form relationships tend to identify as "blues".

zxcvbn [2] was created by Dropbox for the purpose of rating the strength of passwords. It generates scores ranging from zero to four, with a zero score being considered "too guessable" and four being considered "very unguessable".

It has been shown that MTurk participants are more demographically diverse [1, 3, 8, 10], which is something that we saw in our survey responses in terms of a wider age range for participants. Previous work has found some relationship between personality and cybersecurity behavior, e.g. neurotic people tend to be more likely to fall for phishing e-mails [4] and open people tend to post more private information on social media. Other work [5] has found that when it comes to cybersecurity, extroverts tended to behave better. [6] found no relationship between personality trait and password strength. This research shows that there is some correlation between personality and password strength.

3 RESULTS

168 people participated in the SONA survey. 73% of participants identified as women, 25% identified as men, 1% identified as Gender Non-Conforming / Non-Binary, and 1% identified as transgender. 62% of participants were under the age of twenty, and 38% of participants were in their 20s. 391 people participated in the MTurk survey. 44% of participants identified as women, 55% identified as men, and 1% identified as Gender Non-Conforming / Non-Binary. Additionally, 23% of participants were in their 20s, 39% were in their 30s, 19% were in their 40s, 11% were in their 50s, 7% were in their 60s, and 1% were in their 70s. The SONA data collection ran from February 2020 to May 2020 while the MTurk data collection ran from March 2020 to June 2020.
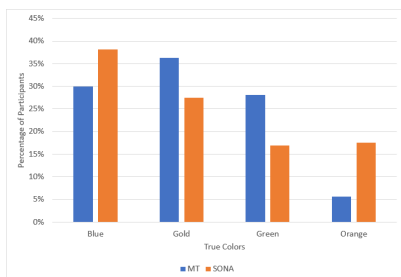

Figure 1: Participants with each True Color self-schema in MTurk (MT) vs SONA.

Figure 1 shows the % of participants for each True Color self-schema in MTurk vs SONA. While the majority of MTurk participants identified with Blue, Gold, or Green, few identified with Orange. However, an Orange personality was slightly more common in the SONA survey of college students than the MTurk survey of the general public. Individuals with the Orange personality self schema tend to be more comfortable taking risks and being more action-oriented. This describes most college-age students, so that explains why SONA participants had more Orange personalities.

Figure 2 shows the % of participants that received each zxcvbn score in both MTurk and SONA. The figure shows that a higher
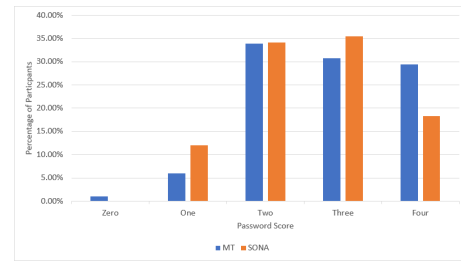

Figure 2: Password Scores in MTurk vs SONA.

% of MTurk participants received a zxcvbn score of 4 than SONA participants. This may be because of the age differences between participants in MTurk and SONA. The password score differences of these two groups could indicate a correlation between age and password strength. This could be because participants who are older are working adults and might receive more cybersecurity training at the workplace.

One method used to measure a participant's security knowledge and behavior is the Human Aspects of Information Security Questionnaire (HAIS-Q) [7]. The questionnaire consists of 9 questions. Figure 3 shows the HAIS-Q score for MTurk and SONA.
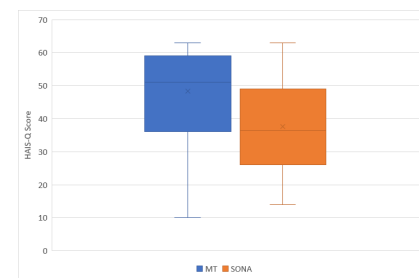

Figure 3: HAIS-Q scores for MTurk vs SONA.

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