Ibrahim Ege Oral

Deniz Çetin

Ömer Can Öztürk

Meerab Farooqui

Minha Javed

Elif Güler

Eralp Akçay

1. Abstract

In the research project, “Identifying and Measuring Personality Traits that Makes Entrepreneurs” we started with brainstorming personality traits that the team believed were relevant to the personality of entrepreneurs. We corroborated these traits with academic sources which were accessed through two main platforms: Web of Science and Google Scholar. The team considered a range of papers from different journals, geographies, and research teams to find the most prominent personality traits within empirical research on Entrepreneurs. The most commonly occurring independent variable in the studies was the Big Five Personality Traits: Extraversion, Agreeableness, Openness, Conscientiousness, and Neuroticism. There was extensive research proving the significance of these traits within Entrepreneurial personalities. An anomaly within the research findings was the paper “Early Life Shocks and Entrepreneurship: Evidence from the Vietnam War” which pointed out trauma as a key indicator for Entrepreneurial personalities. From that point, the team streamlined the research process towards trauma

and how its presence may lead to successful Entrepreneurs. After the research was done, the team then went on to think how we can measure such traits in an entrepreneur candidate or how we can determine whether an individual possesses these traits. To examine such cases, the team has developed a simple Graphical User Interface (abbreviated as GUI) based game that was written in Python which gradually becomes harder as the user keeps leveling up.

2. Introduction

The study “Identifying and Measuring Personality Traits that Make Entrepreneurs” is conducted by Assistant Professor of Strategy and Entrepreneurship, Kerem Kılıç, along with a team of 6 undergraduate students. The aim of this research project is to understand and analyze the specific personality traits that are intrinsically present within humans which lead them to become entrepreneurs. The process included a two-phased Literature Review on personality traits which provided data for the game development. The game was intended to behave like a “litmus paper” in the sense that it can be used as a medium to check whether an entrepreneur possesses these personality traits or not. It gets progressively challenging, pushing the players to perform better and more focused or crumble under pressure and make them give up. The results we get from playing the game help us determine if such entrepreneurs will be successful or not and

whether they have the traits that were present in the Literature Review depending on their scores and replay counts.

In the first phase of the Literature Review, the team studied general personality traits. The most commonly occurring independent variable influencing entrepreneurship was the Big 5 Personality Traits: Agreeableness, Conscientiousness, Openness, Extraversion, and Neuroticism.

Many influential academic journals published studies regarding this topic and detailed its significance. For example, a study conducted by Bazkiaei, Heng, Khan, Saufi, and Kasim (2020) titled "Do Entrepreneurial Education And Big-Five Personality Traits Predict Entrepreneurial Intention Among University Students?" proved that entrepreneurial education, when coupled with the Big 5 personality traits, can lead to strong entrepreneurial intention. These findings were verified by the journal article "Big Data Methods, Social Media, And The Psychology Of Entrepreneurial Regions: Capturing Cross-County Personality Traits And Their Impact On Entrepreneurship In The Usa" by Obshonka, Lee, Rodriguez-Pose, Eichstaedt, and Ebert (2020). Targeting their research towards 1772 US counties, the results show big data-backed proof that the Big 5 traits are significantly associated with entrepreneurship. Another perspective laid emphasis on varying personality traits. Karabulut (2016) detailed through factor analyses and multiple regression analyzes the effects of Internal locus of control, need for achievement, risk tolerance, and entrepreneurial alertness in the paper "Personality Traits on Entrepreneurial Intention". Conducted among 480 Turkish graduate students, the

findings showed that these personality traits had a positive relationship with entrepreneurial intention. Risk tolerance was a trait that appeared frequently in other research findings. “Entrepreneurship training, risk aversion and other personality traits: Evidence from a random experiment”, a journal article by Fairlie and Holleran focused on a sample of 4000+ people participating in a random experiment. It showed that Risk Tolerant and autonomous individuals benefit most from entrepreneurial training, increasing the likelihood of them becoming entrepreneurs in the future.

The most unique finding from the first phase was a paper titled “Early life shocks and entrepreneurship: Evidence from the Vietnam War” by Churchill, Munyani, Smyth, and Trinh. The paper pointed out trauma as a key indicator for Entrepreneurial personalities. It showed that individuals who have gone through major traumatic events such as wars and witnessed their consequent actions (in this case: bombing) are more likely to become entrepreneurs in the future. From that point forward, we streamlined our search and focused on traits relating to trauma that are intrinsic to entrepreneurs.

In the second phase of the Literature Review, we focused on the topic of trauma in general from the direction of our personality trait research. The first study that we focused on examines the relationship between childhood adversities such as neglect, abuse, and poverty, and career success among entrepreneurs. The authors propose that there is an inverted U-shaped relationship between these adversities and career success, which is mediated by resilience. Using data from a representative sample of 573 US

entrepreneurs, the study finds support for this hypothesis, and finds that resilience is particularly important for less successful entrepreneurs. The results of the study suggest that the effects of childhood adversities on career success may be nonlinear and context-specific, and highlight the need to consider these factors in research on childhood adversities and entrepreneurship. The second study aims to investigate the relationship between past entrepreneurial failure and future entrepreneurial intentions, and the moderating role of past failure on the relationship between attitude, subjective norms, and perceived behavioral control (PBC) and entrepreneurial intentions. Using data from the Ghana Global Entrepreneurship Monitor Adult Population Survey, the authors find that past entrepreneurial failure has a positive effect on future entrepreneurial intentions. They also find that the interaction between attitude and failure, subjective norms and failure, and PBC and failure, all have positive effects on future entrepreneurial intentions. The results of the study suggest that past failure can be a useful predictor of future entrepreneurial intentions, and that the relationship between failure and intentions is mediated by various psychological factors. The third study investigates the causes of business failure and the learning outcomes that result from the failure experience of entrepreneurs. The data for the study were collected through interviews with 13 entrepreneurs who had closed their businesses after operating for at least 3 years. The results of the thematic analysis of the interviews showed that the majority of business failures were caused by a combination of internal (individual/organizational) and external (environmental) factors. The study also identified three main outcomes in the process of entrepreneurial learning: recognizing opportunities, exploiting opportunities, and

improving interpersonal relations. These findings suggest that business failure can provide valuable learning opportunities for entrepreneurs. The last study for this topic combines both the first and second phase of the literature review that investigates the factors that influence entrepreneurial decisions during times of war, using primary survey data from Afghanistan. The study finds that perceived danger is negatively related to entrepreneurial intentions, but this relationship is weaker among individuals who are highly resilient. The results also suggest that individuals are more likely to develop entrepreneurial intentions if they are resilient and have strong entrepreneurial self-efficacy. The findings have implications for the use of role models and entrepreneurship training in war-affected areas. In the last study, we focused on the general career transitions resulting from traumatic experiences that investigates the mechanisms behind discontinuous career transitions resulting from traumatic life events, using a multiple case study method to examine the experiences of soldiers and Marines disabled by wartime combat. The study finds that these transitions can be difficult due to counterintuitive obstacles that stem from the traumatic nature of job loss. The most effective way to manage these transitions appears to be through efforts to reconstruct foundational assumptions about the world, humanity, and self, which can enable the development of future-oriented career strategies and help individuals progress towards establishing a new career path. These strategies are most effective when they allow individuals to move away from the past (trauma) and present (obstacles) towards a future career that provides meaning and purpose through work.

3. Process and Reflection

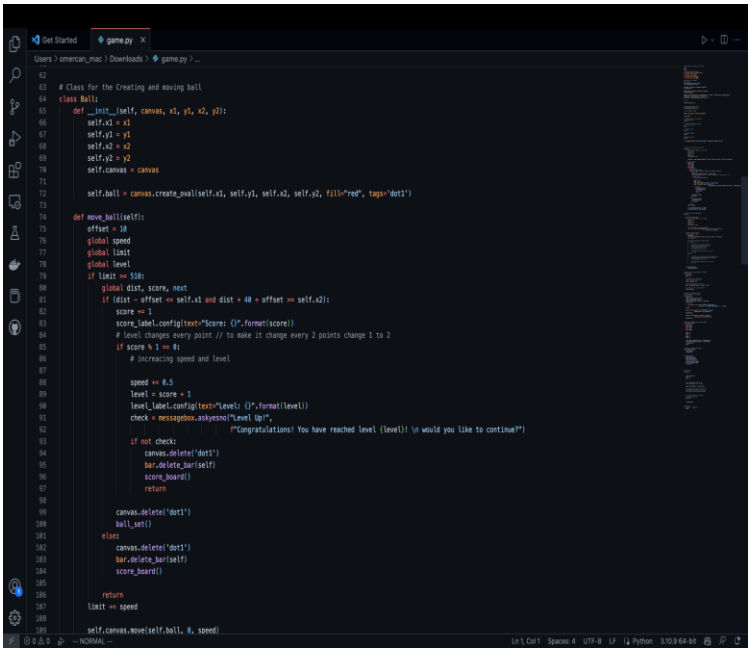
In order to assess the grit and determination of potential entrepreneurs, we have developed a game called "Ball Game" aforementioned in the previous segment. This game allows us to predict which individuals are most likely to be successful in entrepreneurship based on their personality traits. Our aim with such observations is to see how much grit and determination people who are future entrepreneurs possess or to what extent they put this grit to use against progressively challenging cases.

The game was implemented using Python, as it is a widely-used and user-friendly programming language that offers a variety of packages and libraries. To create the game, we imported several packages including "Canvas", "Tkinter", and "Random Integers". We defined variables for the width and height of the game panel and used the "Ball" class to initialize the x and y dimensions of the ball and place it on the canvas. We also created the "Bar" class, which represents the horizontal rectangle that the user moves in order to catch the falling ball.

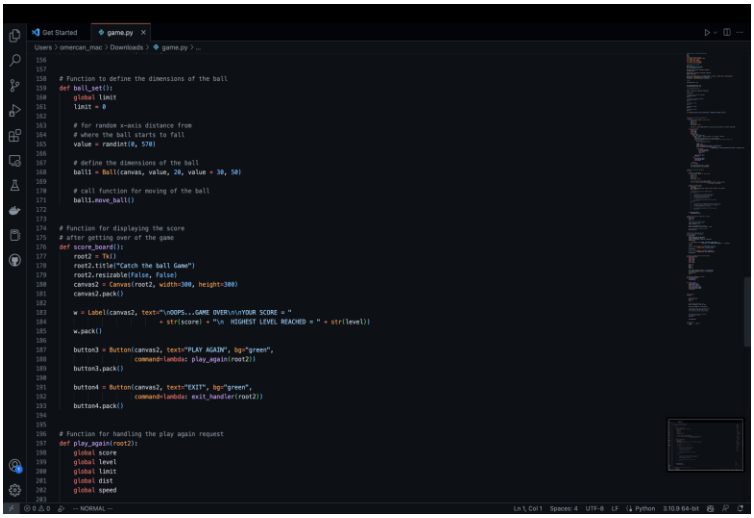
The "move_ball" function was used to increase the speed of the ball and define the winning conditions of the game. If the user successfully catches the ball with the horizontal bar, their score is incremented by one and they advance to the next level. If they fail to catch the ball, the game ends. The user's score is tracked in a separate variable and displayed on the end screen.

In order to allow the user to quickly restart the game after it ends, we created a function to handle play again requests. We also included an exit function to allow the user to close the game. Finally, we added simple code to define the visual representations of the game objects and set the texts and colors of the buttons that handle user requests.

To run the game, we called all of the functions in the driver code and executed it in the terminal of our editor."


Get Started
game.py
Users > omercan_mac > Downloads > game.py > ...
# Class for the Creating and moving ball
class Ball:
def __init__(self, canvas, x1, y1, x2, y2):
self.x1 = x1
self.y1 = y1
self.x2 = x2
self.y2 = y2
self.canvas = canvas
self.ball = canvas.create_oval(self.x1, self.y1, self.x2, self.y2, fill="red", tags='dot1')
def move_ball(self):
offset = 10
global speed
global limit
global level
if limit >= 510:
global dist, score, next
if (dist - offset <= self.x1 and dist + 40 + offset >= self.x2):
score += 1
score_label.config(text="Score: {}".format(score))
# level changes every point // to make it change every 2 points change 1 to 2
if score % 1 == 0:
# increacing speed and level
speed += 0.5
level = score + 1
level_label.config(text="Level: {}".format(level))
check = messagebox.askyesno("Level Up!",
f"Congratulations! You have reached level {level}! \n would you like to continue?")
if not check:
canvas.delete('dot1')
bar.delete_bar(self)
score_board()
return
canvas.delete('dot1')
ball_set()
else:
canvas.delete('dot1')
bar.delete_bar(self)
score_board()
return
limit += speed
self.canvas.move(self.ball, 0, speed)
-- NORMAL --
Ln 1, Col 1 Spaces: 4 UTF-8 LF Python 3.10.9 64-bit


Get Started
game.py
Users > omercan_mac > Downloads > game.py > ...
class for creating and moving bar
class bar1
# method for creating bar
def __init__(self, canvas, x1, y1, x2, y2):
self.x1 = x1
self.y1 = y1
self.x2 = x2
self.y2 = y2
self.canvas = canvas
# for creating bar using create_rectangle
self.rod = canvas.create_rectangle(self.x1, self.y1, self.x2, self.y2,
fill="yellow", tags='dot2')
# method for moving the bar
def move_bar(self, event):
global dist
self.canvas.coords(self.rod, event.x, self.y1, event.x + 40, self.y2)
dist = event.x
# # checking the forward or backward button
# if (num == 1):
#
moving the bar in forward direction by
taking x-axis positive distance and
taking vertical distance y=0
self.canvas.move(self.rod, 20, 0)
#
incrementing the distance of bar from x-axis
dist += 20
else:
#
moving the bar in backward direction by taking x-axis
negative distance and taking vertical distance y=0
self.canvas.move(self.rod, -20, 0)
#
# # decrementing the distance of bar from x-axis
# dist -= 20
def delete_bar(self):
canvas.delete('dot2')
# Function to define the dimensions of the ball
def ball_set():
global limit
-- NORMAL --
Ln 1, Col 1 Spaces: 4 UTF-8 LF Python 3.10.9 64-bit



```
# Function to define the dimensions of the ball
def ball_set():
    global limit
    limit = 0

    # for random x-axis distance from
    # where the ball starts to fall
    value = randint(0, 570)

    # define the dimensions of the ball
    ball1 = Ball(canvas, value, 20, value + 30, 50)

    # call function for moving of the ball
    ball1.move_ball()


# Function for displaying the score
# after getting over of the game
def score_board():
    root2 = Tk()
    root2.title("Catch the ball Game")
    root2.resizable(False, False)
    canvas2 = Canvas(root2, width=300, height=300)
    canvas2.pack()

    w = Label(canvas2, text="\nOOPS...GAME OVER\n\nYOUR SCORE = "
                            + str(score) + "\n  HIGHEST LEVEL REACHED = " + str(level))
    w.pack()

    button3 = Button(canvas2, text="PLAY AGAIN", bg="green",
                     command=lambda: play_again(root2))
    button3.pack()

    button4 = Button(canvas2, text="EXIT", bg="green",
                     command=lambda: exit_handler(root2))
    button4.pack()


# Function for handling the play again request
def play_again(root2):
    global score
    global level
    global limit
    global dist
    global speed
```

```
def exit_handler(root2):
    root2.destroy()
    root.destroy()


def complete_game():
    canvas.delete('dot1')
    canvas.delete('dot2')
    Button.destroy(button0)
    Label.destroy(score_label)
    Label.destroy(level_label)
    score_board()



# Main function
def main():


    global score, dist
    score = 0
    dist = 0


    # defining the dimensions of bar
    bar1 = bar(canvas, 5, 560, 45, 575)

    canvas.bind('<Motion>', bar1.move_bar)

    # defining the text,colour of buttons and
    # also define the action after click on
    # the button by calling suitable methods


    # calling the function for defining
    # the dimensions of ball
    ball_set()


    root.mainloop()


# Driver code
if __name__ == "__main__":
    main()
```

Figure 1 to Figure 4: Implementation Codes

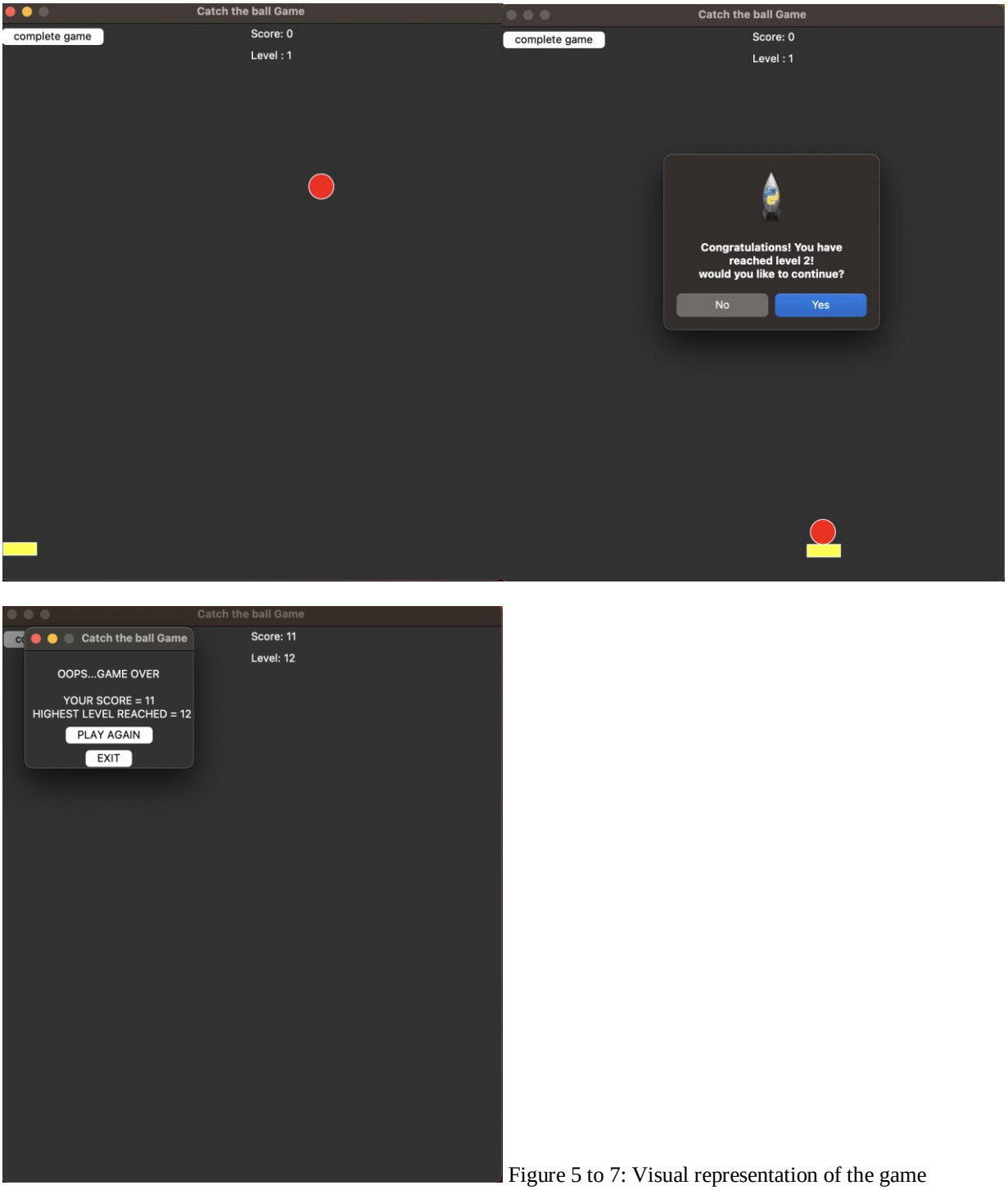


Figure 5 to 7: Visual representation of the game

4. Discussion

Predicting entrepreneurial traits within an individual is a difficult task. The research which has already been conducted in this area highlighted the significance of the

Big 5 personality traits in current and potential entrepreneurs. The game was produced with the intention of highlighting whether an individual could possess certain entrepreneurial characteristics, such as determination and grit, that would allow them to face entrepreneurial challenges in the future.

Going up a level increases the level of difficulty; as a result, the challenges faced by the users increase. This tests not only their determination but openness, which is one of the Big Five Personality Traits. People who display this characteristic are able to tackle newer and more difficult challenges and have a more open minded approach to new situations.

Similarly, this game can also indicate conscientiousness, another important trait amongst the Big Five. Highly conscientious people tend to approach situations with a clearer and more methodical approach. Their behaviors are goal oriented; this game provides users with a clear goal to achieve and conscientious people will be able to achieve that goal by coming up with an approach that works for them.

By increasing the difficulty of each additional level, this game will also test an individual's neuroticism. Neurotic people experience dramatic changes in their moods and are unable to respond well to stress and high pressure situations. These traits can be detrimental in an entrepreneur, as they often have to face high pressure situations and respond to problems with an effective solution. As this game offers users challenges with

increasing levels of difficulties, it tests out how neurotic they are; individuals who are unable to respond calmly and methodically to these challenges and are prone to outbursts and unable to meet the demands of the game will have a more difficult time becoming entrepreneurs.

The research conducted also highlighted how resilience was a prominent and necessary trait that could be found in entrepreneurs, especially those who had experienced trauma in their lives. This game requires resilience due to its increasing difficulty levels. Those with lesser resilience will be less likely to see the game through and more likely to give up; individuals with higher resilience will be able to complete the game and rise up to the challenges of the game.

5. Conclusion

Our research corroborates previous research by highlighting the traits that are prominent in entrepreneurs, traits that could also help in the prediction of future entrepreneurs. The most prominent characteristics found were the Big Five Personality Traits: Extraversion, Agreeableness, Openness, Conscientiousness, and Neuroticism. Entrepreneurs were found to have high conscientiousness, extraversion, openness, and low neuroticism. Additionally, our research chose to focus on traumatized individuals to assess the role, if any, that trauma plays in creating entrepreneurs. The results agreed that individuals who had suffered through trauma could become great entrepreneurs if they showed resilience. Resilience was the key trait that differentiated between traumatized individuals who were more likely to become entrepreneurs and those that weren’t.

The team, then, created a game that could assess these traits to predict whether an individual could become an entrepreneur. The game had various levels, each one more difficult and with more challenges than the previous. The objective was to test an individual's openness, conscientiousness, neuroticism, and resilience. By challenging these individuals, the game will be able to test their determination in completing the tasks at hand. An individual's responses act as indicators to their characteristics and will determine whether they're likely to become an entrepreneur. Consequently, this research highlighted the significant characteristics that can be observed in current entrepreneurs and created a game that could test those characteristics in potential entrepreneurs.

References:

- Bazkiaei, H. A., Heng, L. H., Khan, N. U., Saufi, R. B., & Kasim, R. S. (2020). Do entrepreneurial education and big-five personality traits predict entrepreneurial intention among universities students? *Cogent Business & Management, 7*(1), 1801217. doi:10.1080/23311975.2020.1801217
- Obschonka, M., Lee, N., Rodríguez-Pose, A., Eichstaedt, J. C., & Ebert, T. (2019). Big Data Methods, social media, and the psychology of entrepreneurial regions: Capturing cross-county personality traits and their impact on entrepreneurship in the USA. *Small Business Economics*, *55*(3), 567-588. doi:10.1007/s11187-019-00204-2

- Karabulut, A. T. (2016). Personality traits on entrepreneurial intention. *Procedia - Social and Behavioral Sciences*, *229*, 12-21. doi:10.1016/j.sbspro.2016.07.109
- Fairlie, R. W., & Holleran, W. (2012). Entrepreneurship training, risk aversion and other personality traits: Evidence from a random experiment. *Journal of Economic Psychology*, *33*(2), 366-378. doi:10.1016/j.joep.2011.02.001
- Awaworyi Churchill, S., Munyanyi, M. E., Smyth, R., & Trinh, T. (2021). Early life shocks and entrepreneurship: Evidence from the Vietnam War. *Journal of Business Research, 124*, 506-518. doi:10.1016/j.jbusres.2020.11.009
- Haynie, J. M., & Shepherd, D. (2011). Toward a theory of discontinuous career transition: Investigating career transitions necessitated by traumatic life events. Journal of Applied Psychology, 96(3), 501–524. https://doi.org/10.1037/a0021450

- Acheampong, G. and Tweneboah-Koduah, E.Y. (2018), "Does past failure inhibit future entrepreneurial intent? Evidence from Ghana", Journal of Small Business and Enterprise Development, Vol. 25 No. 5, pp. 849-863. https://doi.org/10.1108/JSBED-03-2017-0128
- Nuray Atsan, Failure Experiences of Entrepreneurs: Causes and Learning Outcomes, Procedia - Social and Behavioral Sciences, Volume 235, 2016, Pages 435-442, ISSN 1877-0428, https://doi.org/10.1016/j.sbspro.2016.11.054.
- Wei Yu, Fei Zhu, Maw Der Foo, Johan Wiklund, What does not kill you makes you stronger: Entrepreneurs' childhood adversity, resilience, and career success,

Journal of Business Research, Volume 151, 2022, Pages 40-55, ISSN 0148-2963, https://doi.org/10.1016/j.jbusres.2022.06.035.

- Bullough, Amanda and Renko, Maija and Myatt, Tamara, Danger Zone Entrepreneurs: The Importance of Resilience and Self-Efficacy for Entrepreneurial Intentions (May 23, 2012). Entrepreneurship Theory and Practice, 38(3), 473-499., Available at SSRN: https://ssrn.com/abstract=3079233