MTFC Project Proposal 2024-25

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MTFC Project Proposal Template Use Notes:

- *Refer to the official MTFC Project Proposal Prompts 2024-25 for the 15 prompts and scoring instructions.*
- *The use of this template is OPTIONAL.*
    - *It is provided as an optional resource for teams to keep their Project Proposal response organized. Teams who wish to use this template should make a copy in order to edit.*
- *The final version of the team's MTFC Project Proposal should be downloaded as a PDF or Word document to submit on the ICS Dashboard. A single file will be submitted.*
- *Additional resources (including the Actuarial Process Guide) can be found on the Modeling the Future Challenge website: https://www.mtfchallenge.org/resources/*
- *Please direct any questions to challenge@mtfchallenge.org.*

Part 1: Project Definition *(Team's Topic)*

These prompts can be found on page 3 of the MTFC Project Proposal Prompts 2024-25. Additional information on Project Definition can be found in ***Step 1: Project Definition*** in the Actuarial Process Guide.

Team Responses:

#1: Identify the topic

- Response: The topic that our team is proposing to investigate is the effects of social media on mental health in teens. This is an incredibly important topic because it is a prevalent issue in teens. It has seen a sudden and recent change in the past few years because of the increased use of social media in the younger generation, leading to a rise in cyberbullying, peer pressure, and negative impacts on mental health. All these effects have led to increasing suicidal thoughts in teens. This issue directly affects teens and young adults, but can also indirectly impact their close friends and family. This is a global issue, as social media has heavy use across the world, and is heavily tied to mental health issues.

#2: Identify potential risks

- Response: Some potential risks from mental health issues due to social media use are mental health deterioration, increases in suicide rates, and mental health disorders. The best case scenario is that a teen impacted by these mental health issues gets help. The worst case scenario is that a teen greatly suffers from mental health disorders and resorts to suicide.

#3: Identify a behavior change risk mitigation strategy

- Response: A specific behavior change risk mitigation strategy is to lower the reliance and time spent on social media by teens. The group that would be most impacted by this implementation would be the younger generation (teens and young adults on social media).

#4: Identify a modifying outcomes risk mitigation strategy

- Response: A specific modifying outcomes risk mitigation strategy is to have parents regulate the screen time of their teens. The group that would be most impacted by this implementation would be the younger generation (teens on social media).

#5: Identify an insurance risk mitigation strategy

- Response: An insurance risk mitigation strategy is liability insurance, as it reduces cyberbullying due to participants potentially being held liable for their actions and negative impacts on their peers (eg. mental health disorders, suicide). The group that would be impacted by this implementation would be teens and young adults.

#6: Identify driving research questions for your topic

- Response:
    - How effective is help for teens who are suffering from mental health disorders? Does this really help lower suicide rates? How effective is it?
    - If social media use by teens is regulated, how effective is this at improving mental health in teens?

Part 2: Data Identification & Assessment *(Team's Topic)*

These prompts can be found on page 4 of the MTFC Project Proposal Prompts 2024-25. Additional information on Data Identification and Assessment can be found in ***Step 2: Data Identification & Assessment*** in the Actuarial Process Guide.

Team Responses:

#7: Identifying the type of data you hope to find

- Response: The type of data we are looking for is the amount of time spent on social media by different age groups, and whether or not they experienced mental health deterioration. The dataset would include suicide rates by age group, as well as charts showing time spent on different social media platforms vs how many people experienced mental health deterioration as a result.

#8: Identify potential data sources for your topic

1. Suicide Data and Statistics | Suicide Prevention | CDC - historical frequency
    a. This is a credible source because it is from the CDC, a government-run program. This page provides multiple datasets including suicide numbers by state and age. We will use this data to analyze suicide rates.
2. Our World in Data:
    a. This is a credible source because it compiles data from multiple reputable organizations.
    b. https://ourworldindata.org/suicide - historical frequency
    c. This dataset shows the different age categories that suicide has affected in various countries around the world. We will use this dataset in order to analyze what specific age categories are most affected by suicide.
3. WHO
    a. These are all credible sources because they are from the World Health Organization, which is a part of the United Nations and is responsible for global public health.
    b. Suicide worldwide in 2019: global health estimates - historical frequency
        i. This dataset has analyzed data in different charts and graphs and can be used in addition to raw data to help make conclusions about suicide rates based on social media, as well as mental health deterioration overall.
    c. https://www.kaggle.com/datasets/szamil/who-suicide-statistics - historical frequency
        i. This data is from across the world and suicide rates are from different countries. It can be used in addition to a dataset on suicide rates from different social media platforms to see how much of an impact social media has on suicide rates across the world. Different types of charts, such as bar graphs, can be created to help analyze the data.
    d. https://www.kaggle.com/datasets/abmsayem/suicide-around-the-world - historical frequency
        i. This data is from across the world and suicide rates are from different countries. It can be used in addition to a dataset on suicide rates from different social media platforms to see how much of an impact social media has on suicide rates across the world. Different types of charts, such as bar graphs, can be created to help analyze the data.

Part 3: Mathematical Modeling *(Team's Topic)*

These prompts can be found on page 5 of the MTFC Project Proposal Prompts 2024-25. Additional information on Mathematical Modeling can be found in ***Step 3: Mathematical Modeling*** in the Actuarial Process Guide.

Team Responses:

#9: Modeling research on your topic

- Response: When we searched for existing math models on this topic, we found scientific papers that linked social media to depression and depression to suicide, as well as papers that discussed ways to reduce dependency on social media (methods for both teens themselves and parents of teens). Many of the sources have good concepts to consider when creating our math model and ways to reduce loss or risk but doesn't have any actual math models to use for this issue. Another paper had social media addiction vs depression and created a math model to represent this scenario, and we plan to use this paper to lay the basic foundation for our math model. Some other papers that we found were papers that talked about general risk factors that lead to suicide in adolescents, but these particular papers didn't address mental health deterioration through social media usage as a risk factor.
- Social Media & Suicide
- Mathematical modelling, analysis and numerical simulation of social media addiction and depression - PMC
- Social Media and Suicide: A Public Health Perspective - PMC
- Internet Use and Web Communication Networks, Sources of Social Support, and Forms of Suicidal and Nonsuicidal Self-Injury Among Adolescents: Different Patterns Between Genders
- Cyberbullying linked with suicidal thoughts and attempts in young adolescents | National Institutes of Health (NIH)

#10: Goals of a mathematical model in the project phase

- Response: In this project, we hope to create a math model that relates dependency on social media (such as time spent on social media) to depression in teens or young adults and suicide rates in those age groups. By showing a relation between these two things, this math model can be used to identify the likelihood of suicide based on the dependency someone has on social media. Another thing this model could do is help identify elements such as deterioration in mental health based on social media dependency, and this element can then be tied to the risk of suicide. The mathematical analysis that seems most fruitful to pursue in our project for this topic is different graphs and charts that show the links between our different variables (dependency and time spent on social media), to see if there is a correlation between these and if suicide or mental health issues can be predicted based on social media dependency. Another potential mathematical analysis method we could use is a table with different percentages, averages, and statistical tests of raw data to see the impact these numbers have on our risks and losses.

#11: Assumption development

- Response: One of the key assumptions that we have to make is that increased exposure to social media platforms will correlate with increased mental health deterioration and risks, potentially leading to higher suicide rates. Another key assumption that we made is that social media's influence on suicide rates differs by demographic. We also assumed that the likelihood of committing suicide because of social media decreases with age because time spent on social media decreases as age increases.

Part 4: Risk Analysis *(Team's Topic)*

These prompts can be found on page 6 of the MTFC Project Proposal Prompts 2024-25. Additional information on conducting a Risk Analysis can be found in ***Step 4: Risk Analysis*** in the Actuarial Process Guide.

Team Responses:

#12: Goals for mitigation strategy

- Response: Some potential risks from mental health issues due to social media use are mental health deterioration, increases in suicide rates, and mental health disorders. The best case scenario is that a teen impacted by these mental health issues gets help, leading to an overall reduction in suicide rate. The worst case scenario is that a teen greatly suffers from mental health disorders and resorts to suicide.
- Potential Risks:
    - Mental Health Deterioration: Potential outcome scenarios of social media's impact on mental health leading to mental health deterioration include mood swings, sleep disturbances, and Social withdrawal A person may experience anxiety, hopelessness, worthlessness, or constant anger. They may also have trouble relaxing, worry more, or experience forgetfulness.
    - Increases in Suicide Rates: A potential outcome scenario of social media's impact on mental health leading to increases in suicide rates is when the person has increased exposure to unrealistic portrayals of other people's lives, which makes them feel pressured to live up to those standards. That constant pressure can make them feel suicidal.
    - Mental Health Disorders: A potential outcome scenario of social media's impact on mental health leading to Mental Health Disorders is high rates of depression and anxiety. An individual developing anxiety or depression due to constant comparison with people on social media, leading to feelings of inadequacy and low self-esteem, specifically when a lot of time is spent on platforms showcasing "perfect" lifestyles and appearances, which has the chance of triggering existing mental health issues like body dysmorphia or eating disorders.

Part 5: Recommendations *(Team's Topic)*

These prompts can be found on page 7 of the MTFC Project Proposal Prompts 2024-25. Additional information on making Recommendations can be found in ***Step 5: Recommendations*** in the Actuarial Process Guide.

Team Responses:

#13: Recommendation differences between mitigation strategies

- Response: One of the biggest factors that will determine which risk mitigation strategy is thinking about the context of the problem. In the context of this problem, having an insurance risk mitigation strategy doesn't really make sense as it doesn't directly relate to the problem being asked. Another big metric that must be considered when determining the best risk mitigation strategy is to consider the effectiveness of the strategy, and how likely it is to be applicable and efficient for multiple age groups, including both younger and older teens, and young adults. Having a strategy that can apply to the greatest population possible is the best idea, as it has the greatest chance of success.

#14: Audience for recommendations

- Response: There are two possible audiences. The first audience would be the social media companies, because they have both the financial resources and technical capabilities to implement risk mitigation strategies, such as improving algorithms to identify harmful content or incorporating mental health support into their platforms. Their involvement is critical as they directly influence the online environment where these risks occur and can enact meaningful change to reduce harm.
- Another possible audience for recommendation is the parents and near family of the teens because they can implement screen time and other regulations for the teens. as they are often the first line of support for teens facing mental health challenges. They can help by monitoring social media use, recognizing warning signs, and learning to identify early indicators of mental health struggles or suicidal ideation.

#15: Goals for situation improvement

- Response: The goal of this project is to lower suicide rates and make it as minimal as possible. The best-case scenario outcome would be for the suicide rate to be zero. We hope that the recommendations we make in this project overall help teens and young adults who are struggling to reduce the severity of their mental health illnesses, prevent new people from getting these illnesses, and make sure that suicide rates are lowered.