CHAPTER I INTRODUCTION

The Introduction chapter introduces the topic of this research, as well as this research's significance and goal. This chapter comprises four sub-chapters: background, problem formulation, objective, and research benefits.

I.1 Background

In our modern society, mental health problems represent a significant global health challenge, and Indonesia is no exception. However, the challenge in Indonesia is not only the prevalence of mental health issues but also the widespread lack of awareness and early detection. Based on a survey report of 5,664 adolescents conducted by I-NAMHS, more than one-third of the adolescents (34,9%) reported having mental health problems in the past 12 months (Center for Reproductive Health et al., 2022). As shown in Figure I-1, anxiety was the most common mental health issue of the adolescents surveyed. The second most prevalent condition was problems with inattention, followed by depression as the third.

Despite this, Indonesians typically do not recognize common symptoms as legitimate concerns (stress, loneliness, poor sleep), nor do they conceptualize mental illness as a normal aspect of the human experience (Willenberg et al., 2020). For that reason, early signs of mental health challenges in Indonesia often go unnoticed until they escalate into severe conditions.

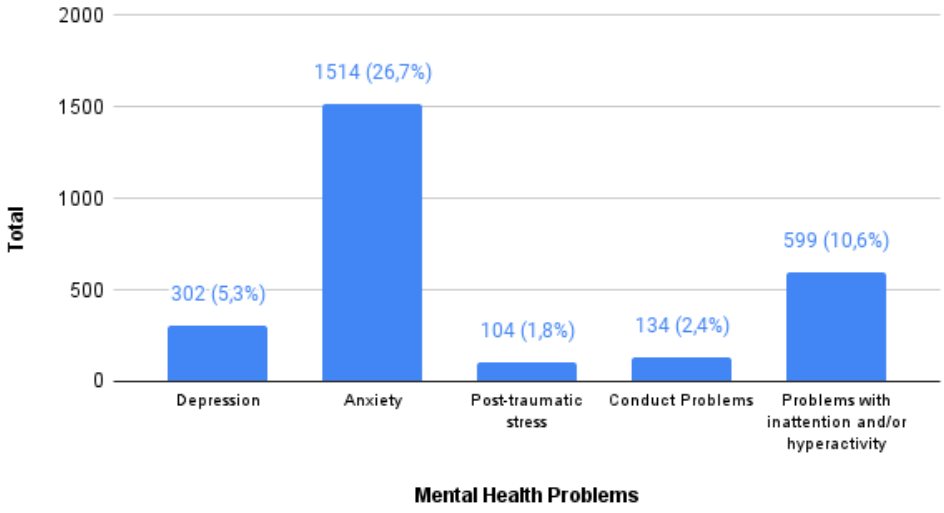

Figure I-1. Mental health problems in Indonesian adolescents by type (Center for Reproductive Health et al., 2022)

In Indonesia, social media has become intricately woven into daily activities among the people, with Facebook and TikTok being some of the popular platforms out there as shown in Figure I-2. Facebook was reported to be the third most used social media platform in Indonesia as of January 2024, with an impressive 81.6% penetration rate among 16–64-yearolds, translating to around 117.6 million users. TikTok surpassed even this figure with a user base of 126.8 million people aged 18 and above (We Are Social & Meltwater, 2024). These digital expressions often carry subtle but meaningful indicators of a person's mental health state, which could help prevent serious conditions from developing if identified early.

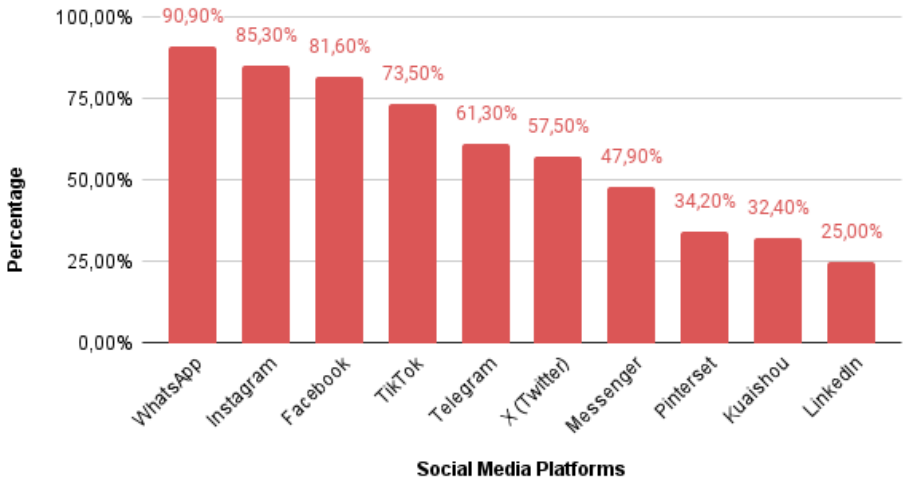

Figure I-2. Leading social media platforms in Indonesia (We Are Social & Meltwater, 2024)

Machine learning presents an opportunity to automatically detect these early warning signs from social media posts, especially in contexts like Indonesia, where access to mental health services is limited and stigma remains high. In recent years, social media data has increasingly attracted research in the area of predictive mental health through machine learning. (Bokolo, 2023; Elujide, 2021; Musleh, 2022).

Bokolo et al. (2023) experiment a variety of machine learning and deep learning models to identify depression in social media posts using Twitter as their data source. The research explored how well a machine learning or deep learning model could classify depressive thoughts from Twitter using a dataset of 632,000 tweets. The research's findings showed that the models can successfully identify patterns

linked to depression in social media posts, with one deep learning method achieved an exceptionally high accuracy rate of 98.1%.

Elujide et al. (2021) addressed the classification of multiple mental illnesses in Nigerian psychiatric clinic patients. They examined 500 cases of schizophrenia, bipolar disorder, attention-deficit/hyperactivity disorder (ADHD), and insomnia. This research discovered that machine learning models achieved accuracy of 64.1% and 75.17% for deep learning techniques.

Musleh et al. (2022) explored the classification of depression among Arabic Twitter text data. They analyzed the Twitter data, looking for patterns that might indicate someone was struggling with depression. After testing several machine learning models, their research found that the Random Forest algorithm performed the best in accuracy, which is 82.39%.

However, these studies reveal several critical limitations that this research aims to address. First, Bokolo et al. (2023) and Musleh et al. (2022) both employed single-label classification approaches, focusing solely on depression detection without considering the potential co-occurrence of multiple mental health conditions. This approach may not reflect the complex nature of mental health disorders, where individuals often experience multiple conditions simultaneously. By ignoring this factor, single-label approaches may produce an incomplete or misleading assessment of a person's mental state. Second, Elujide et al. (2021), while addressing multiple mental health conditions, focused on clinical patient data rather than social media text analysis, limiting its applicability to social media-based mental health detection, where people are more likely to express early or hidden symptoms informally. As a result, models trained solely on clinical data may not generalize well to the more ambiguous and context-dependent language of social platforms. Third, all three studies were conducted on non-Indonesian language datasets, leaving a significant gap in mental health classification research for Indonesian social media users despite the high prevalence of mental health issues and social media usage in Indonesia.

Given the increasing prevalence of mental health issues among Indonesian adolescents and the widespread cultural stigma preventing early diagnosis, there is an urgent need for automated tools that can detect early signs of psychological distress. Without timely intervention, these conditions may escalate, leading to serious outcomes such as self-harm or even suicide. Social media platforms like TikTok and Facebook represent an untapped opportunity to identify these signals in real-time, especially in a population reluctant to seek professional help.

Therefore, this research focuses on developing a model that is capable of classifying depression and anxiety through the analysis of related social media text data, in this case, TikTok and Facebook posts in Indonesian, to determine possible symptoms of depression and anxiety. This research focuses specifically on depression and anxiety due to their strong clinical significance and clearer linguistic expression in social media text. The research employs multi-label classification instead of the conventional single-label classification approach because it acknowledges the fact that mental illnesses tend to occur as a combination among themselves (McGrath et al., 2020). The research utilizes a transformer-based architecture model that is famous for its ability to capture contextual aspects of natural language, which makes it ideal for use in studying the Indonesian language and emotions related to mental health issues.

I.2 Problem Formulation

Given the research background, this research will address the following key questions:

1. How can a transformer-based multi-label classification model be developed to detect symptoms of depression and anxiety from Indonesian-language social media posts?
2. How does the model perform in identifying cases where depression and anxiety co-occur in a single post, based on standard evaluation metrics?

I.3 Research Objective

Based on the problem formulation, this research objective is as such:

1. Collect and preprocess Indonesian-language social media text data relevant to mental health from Facebook and TikTok.

2. Design and train a transformer-based model for the multi-label classification of depression and anxiety symptoms.
3. Evaluate the model's performance in classifying depression and anxiety in a multi-label setting.

I.4 Research Benefits

The following are groups that are likely to be impacted by the findings of this research.

1. For the community

This research helps normalize the Indonesian community and raise awareness regarding mental health problems since issues related to it, most of the time ignored, are real and can be experienced by anyone. This also helps in understanding better how Indonesians use social media, especially Facebook, to communicate mental health issues which can help in identifying and helping those in need of help for instance even before they seek it.

2. For enterprises

In this research, social media analysis offers a means for enterprises to their decision-making and shape impactful mental health policies. By utilizing social media posts to analyze the level of mental health expressions on the social media platform, organizations can understand what issues are already problematic and in advance, caring and preventive wellness programs can be designed. These insights help businesses address mental health issues effectively, improving community well-being and showcasing social responsibility.

3. For future researchers

This research offers future researchers with valuable insights into using transformer-based models for multi-label mental health classification in Indonesian. It also establishes a foundation for further research and highlights potential areas for improvement in developing more specialized models for Indonesian users.

I.5 Research Limitations and Assumptions

This section outlines the limitations and assumptions of the research. It is essential to recognize these factors to clarify the scope of the research and the situations where the conclusions drawn from the research can be valid.

1. The text data in this research will be collected and analyzed in Indonesian only.
2. The Social media data used in this research is sourced from specific Facebook groups and TikTok hashtags.
3. The text data in this research is limited to posts from 2021 to 2025 period.

I.6 Structure of Report

This research is described in detail through the following writing structure, which outlines each component in a coherent manner.

1. Chapter I – Introduction

This chapter introduces the topic of the study, outlining the context, purpose, and significance of the research. It includes the background of the problem, the research questions, objectives, and the expected benefits of conducting the study. By clearly framing the research focus, this chapter provides the foundation for the entire report.

2. Chapter II - Literature Review

This section reviews prior studies, relevant theories, and methodologies related to the research topic. It helps to position the current research within the existing body of knowledge and highlights the gaps this study aims to address. This chapter ensures that the research is informed by previous findings and built upon a solid theoretical basis.

3. Chapter III - Problem-Solving Methodology

This chapter explains the research approach and step-by-step methodology used to solve the research problem. It includes further explanation of the chosen research methodology and workflow diagrams with the descriptions of the processes. By laying out the research strategy, this chapter provides a transparent blueprint for how the study was conducted.

4. Chapter IV - Problem Resolution

This chapter states how the research problem was analyzed and resolved using a methodology that this research proposed. This section is a critical part of the research as it shows how the research design is used in practice to produce the research outcomes.

5. Chapter V - Validation, Result Analysis, and Implications

This chapter presents the model's performance evaluation and justification behind the selected result. It also evaluates the findings' possible practical implications and talks about the model's deployment. The insights from this chapter validate the effectiveness of the solution and reveal its broader significance.

6. Chapter VI - Conclusions and Suggestions

This final chapter provides a summary of the research results, restates how the goals were met, and makes suggestions for additional research or real-world applications. It brings the study to a close while encouraging further exploration and improvements based on the research outcomes.