Journal of Mathematics Instruction, Social Research and Opinion
Vol. 5, No. 3, September 2026, pp. 2305 – 2321, https://doi.org/10.58421/misro.v5i3.1989
ISSN 2962-7842

The Relationship between Future Time Perspective and Climate Anxiety among Generation Z: The Moderating Role of Gender

Sitti Nurkhalisah Febriani Halil[1], Siti Jaro'ah[2]
[1,2]Universitas Negeri Surabaya, Surabaya, Indonesia

Article Info

Article history:

Received 2026-08-07
Revised 2026-09-14
Accepted 2026-09-17

Keywords:

Climate Anxiety
Correlational Study
Future Time Perspective
Gender Moderation
Generation Z
Indonesia

ABSTRACT

Climate anxiety is an increasingly widespread psychological response among Generation Z, particularly as young people face increasing awareness of the long-term consequences of climate change. Nevertheless, its relationship with future time perspective and the moderating role of gender remain understudied in an integrated manner, particularly in the context of developing countries such as Indonesia. This gap highlights the need to examine how future-oriented cognition and individual characteristics jointly relate to climate anxiety. This study was conducted to determine the relationship between future time perspective (FTP) and climate anxiety (CAS), while simultaneously testing whether gender acts as a moderating variable in this relationship. A correlational quantitative design with a moderation approach was employed, involving 373 Generation Z participants (182 males and 191 females) selected using a purposive sampling technique. Data collection was carried out through the Future Time Perspective Scale (FTPS) and the Climate Anxiety Scale (CAS), which were then processed using Pearson and Spearman correlation tests as well as JASP-assisted moderation regression analysis. The analysis results revealed a significant positive relationship between FTP and climate anxiety ($r = 0.384$, $p < 0.001$), indicating that the higher an individual's future orientation, the greater the climate anxiety they experience. Furthermore, the moderation regression model was statistically significant ($F = 66.730$, $p < 0.001$, $R2 = 0.352$), with both the main effects of FTP ($B = 0.801$, $p < 0.001$) and gender ($B = 30.204$, $p = 0.008$) being significant. The interaction between FTP and gender also showed significance ($B = -0.445$, $p < 0.001$), confirming the role of gender as a moderator in the relationship between FTP and climate anxiety. The positive association between FTP and climate anxiety was stronger among males than females. These findings indicate that future-oriented cognition is positively associated with climate anxiety and that this association differs across gender groups. The findings provide theoretical evidence that integrating cognitive and individual-difference factors may offer a more nuanced understanding of climate anxiety among Generation Z. Practically, the findings may inform the development of gender-sensitive psychological and educational approaches to climate anxiety; however, the cross-sectional correlational design does not establish the effectiveness of gender-specific interventions.

This is an open-access article under the CC BY-SA license.

Corresponding Author:

Sitti Nurkhalisah Febriani Halil
Universitas Negeri Surabaya, Indonesia
Email: sittinurkhalisah.23043@mhs.unesa.ac.id

1. INTRODUCTION

The global climate crisis has become a critical issue with widespread impacts, not only on ecosystems but also on human physical and mental health. Indonesia is an archipelagic country that is quite vulnerable to climate disasters, alongside public environmental awareness that remains relatively low. This is evidenced by BSKDN data (2018), which shows that only 20% or approximately 52 million people in Indonesia care about environmental cleanliness and health. As the world's largest archipelagic state, Indonesia carries a high risk of climate change. With its strategic geographical position, Indonesia ranks third among countries with the highest risk of the impacts of global climate change [1], [2]. These environmental vulnerabilities are important not only because of their ecological and physical consequences but also because repeated exposure to information about climate-related threats may shape individuals' psychological responses to the climate crisis**.** This condition demands serious attention not only toward mitigating physical impacts but also addressing the psychological conditions triggered by ongoing environmental crises [3].

The decline in Indonesia's Environmental Performance Index (EPI) indicates an increase in environmental problems [4]. Indonesia is categorized among countries with poor waste management performance, showing a high mismanaged waste rate of 61% [4]. Although these environmental conditions provide an important context for understanding climate-related concerns in Indonesia, the psychological consequences of environmental degradation are particularly relevant to understanding how individuals perceive and respond to climate change. Archipelagic countries like Indonesia and the Philippines are highly vulnerable to global warming due to their strategic position in the tropical region, making them major hotspots for the impacts of hydro-meteorological disasters. Such vulnerability exposes populations to threats that are not only physical but also psychological, particularly when future environmental risks are perceived as uncertain and difficult to control. The region faces direct and serious threats such as sea-level rise and extreme weather [6]. The study by Yunanto and Sa'adiyah Sy [5] on Indonesian and Philippine climate fiction, for example, illustrates how the collective anxiety of archipelagic societies is portrayed in responding to their ecological future, further indicating that climate-related concerns extend beyond physical impacts into psychological and emotional responses.

A 2021 World Health Organization (WHO) survey across 95 countries revealed that only nine countries integrated psychosocial issues regarding mental health into their vulnerability and adaptation assessment documents. This limited integration highlights the need to pay greater attention to the psychological dimensions of climate change alongside its environmental consequences. The impacts on mental health vary widely, encompassing emotional distress, depression, feelings of loss, and anxiety. Among these psychological responses, climate anxiety refers specifically to anxiety and distress associated with the perceived threat of climate change, rather than anxiety in the broader clinical sense. This negative emotional response to climate change is termed climate anxiety [7]. Climate anxiety is conceptually related to the broader construct of eco-anxiety. However, the two

terms are not completely interchangeable: eco-anxiety may encompass anxiety related to a wider range of ecological and environmental problems, whereas climate anxiety specifically concerns threats associated with climate change. Climate distress similarly emphasizes emotional distress resulting from climate-related threats, while general anxiety refers to a broader psychological state that is not necessarily related to environmental or climate concerns. The 2020 People's Climate Vote survey conducted by the United Nations Development Programme involving over 73,000 people across 77 countries reported that 56% of people think about climate change every day or every week, with Indonesia emerging as one of the countries with the highest increase in worry regarding the issue [8]. These findings indicate that climate change has increasingly become a psychologically salient issue, particularly for individuals who frequently encounter information concerning its present and future consequences.

Climate anxiety is defined as a condition of psychological and physical well-being with varying degrees of intensity characterized by worry over relatively distant future threats closely tied to uncertain, difficult-to-control, and unpredictably accurate ecological disasters [9]. Thus, climate anxiety should be understood as a climate-specific psychological response to perceived environmental threats, rather than being equated with general anxiety or necessarily representing a clinical anxiety disorder. Clayton [10] explains that this phenomenon has two aspects: cognitive-emotional impairments such as difficulty sleeping or concentrating, and excessive rumination, as well as functional impairments marked by an inability to work or engage in social interaction. Research indicates that young adults, including Generation Z, experience substantial effects from climate anxiety because they are the group that will experience the future impacts of climate change. This group also engages in relatively higher digital literacy than others, thus being more widely exposed to information regarding climate issues [10]. Consequently, Generation Z represents an important population for examining climate anxiety because their developmental position, orientation toward the future, and frequent exposure to digital climate information may shape how they cognitively and emotionally respond to climate-related threats. In a scoping review conducted by Léger-Goodes et al. [11] concerning the impacts of climate change awareness on children and adolescents, it was similarly found that younger age groups are consistently more psychologically vulnerable when facing climate issues compared to older adult groups.

In understanding climate anxiety, one relevant psychological factor is time orientation, specifically Future Time Perspective (FTP). FTP is an aspect of the Time Perspective framework developed by Zimbardo and Boyd [12], which explains the extent to which an individual possesses a strong mental representation of the future and focuses on the long-term consequences of an event. FTP plays an essential role in the context of climate change because the impacts of the climate crisis are largely experienced in a real sense in the future; hence, individuals with high FTP tend to be more sensitive to these long-term threats and have a greater likelihood of experiencing negative emotional responses in the form of anxiety [13]. This relationship is particularly relevant to climate anxiety because climate change involves threats whose consequences may unfold over extended periods, requiring individuals to represent and evaluate future outcomes mentally.

Therefore, differences in future-oriented thinking may contribute to differences in the intensity of climate-related psychological responses.

Gender also serves as an individual factor widely associated with differences in the level of climate anxiety. The mental health impacts of climate change are not experienced equally. Males and females exhibit differing psychological response patterns toward the climate crisis. Research indicates that climate change is associated with increased stress, anxiety, and anger in males. In contrast, in females it is linked to more intense emotional responses, including difficulty concentrating and a tendency to cry when facing environmental issues, along with higher stress levels [14]. These differences suggest that gender may not merely be associated with different levels of climate anxiety but may also influence how future-oriented cognition is translated into climate-related emotional responses. Accordingly, gender warrants consideration as a potential moderating factor in the relationship between FTP and climate anxiety.

Although research discussing climate anxiety has grown, studies simultaneously connecting the variables of Future Time Perspective, Climate Anxiety, and Gender within a single integrated model remain limited. Existing studies generally focus on only one aspect—either climate anxiety or future time perspective—without testing their interaction, and few have positioned gender as a moderating variable explaining differences in the strength of relationships among these psychological variables [13]. This limitation is particularly important because examining only the direct relationship between FTP and climate anxiety may overlook individual differences in how future-oriented thinking relates to climate-related emotional responses. Coffey et al. [15], in a scoping review of 18 eco-anxiety studies, also identified a significant research gap, namely the lack of quantitative studies in developing countries, including Indonesia, that examine cognitive predictors of eco-anxiety, and recommended the necessity of testing time orientation variables within non-Western contexts. In the Indonesian context, Laily Mucharomah and Luqman [16] conducted research on Generation Z and found that the intensity of exposure to news regarding climate change drives an increase in ecological anxiety (eco-anxiety). However, this research leaves a gap: the influence of time orientation and gender on the strength of the relationship between these two variables has not been examined. Taken together, previous findings establish the relevance of climate-related psychological responses among younger populations and the potential importance of future-oriented cognition, but empirical evidence integrating FTP, climate anxiety, and gender among Generation Z in Indonesia remains insufficient.

Through this elaboration, previous research has successfully developed a valid Climate Anxiety scale [17], confirmed gender differences in climate anxiety [14], and demonstrated the relevance of time perspective within the context of climate-related emotions and beliefs [13]. However, there is still a lack of research examining the relationship between future time perspective and climate anxiety while simultaneously incorporating gender as a moderating model within an integrated model, particularly focusing on the Generation Z population in Indonesia. Therefore, the present study addresses this gap by integrating cognitive and individual-difference perspectives to examine whether the relationship between future-oriented thinking and climate anxiety

varies according to gender. Based on this, the present study aims to: (1) examine the relationship between future time perspective and climate anxiety among Generation Z; and (2) examine the role of gender as a moderating variable in the relationship between future time perspective and climate anxiety. The novelty of this study lies in combining these three variables within a single moderation analysis model among Generation Z in the Indonesian context, thereby extending previous research that has predominantly examined climate anxiety, ecological anxiety, or future time perspective separately. The novelty of this study lies in combining these three variables within a single moderation analysis model, thereby providing a more comprehensive understanding of how cognitive factors and individual characteristics interact in shaping psychological responses to climate change. This study is expected to contribute empirical evidence to the literature on climate-related psychological responses, particularly by clarifying the role of future time perspective and gender in explaining climate anxiety among Generation Z in a non-Western and climate-vulnerable context such as Indonesia.

2. METHOD

Research Design

This study employed a non-experimental quantitative design using a correlational approach and moderation analysis to examine the relationship between Future Time Perspective (FTP) as the independent variable, Climate Anxiety (CAS) as the dependent variable, and gender as the moderating variable. The correlational design was used to examine the association between FTP and Climate Anxiety, while moderation analysis was employed to determine whether gender changes the strength or direction of this relationship.

Participants and Sampling Technique

The research participants totaled 373 individuals, comprising 182 male participants and 191 female participants, with one data entry excluded from descriptive analyses by gender due to a missing value on the gender variable. Sampling was conducted using a purposive sampling technique with inclusion criteria: (1) aged 17–27 years, representing the Generation Z age range, and (2) domiciled in Indonesia. Thus, the target population consisted of Generation Z individuals in Indonesia who met the predetermined age and domicile criteria. This study utilized a try-out design, which is a data collection approach using the same sample to test the validity and reliability of measuring instruments while simultaneously conducting hypothesis testing; thus, researchers distributed the scale only once for data collection. The use of this approach enabled the researchers to evaluate the psychometric properties of the instruments and conduct the main statistical analyses using the same dataset.

Data Sources and Data Collection Procedure

The study used primary data obtained directly from participants through an online questionnaire. Data were collected via an online questionnaire distributed to participants meeting the criteria. Prior to completing the questionnaire, participants were provided with

information regarding the research objectives and asked to provide informed consent to participate voluntarily. The confidentiality of participant data was fully guaranteed, and data were used solely for the purposes of this research. Participation was voluntary, and participants were informed that they could choose whether to participate in the study.

Research Instruments

Future Time Perspective was measured using the Future Time Perspective Scale (FTPS) developed by Husman and Shell [18]. The FTPS is structured based on four dimensions of future time perspective: valence, connectedness, extension, and speed, comprising 27 items. In this study, the FTPS consists of 27 items using a Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). The FTPS measures individual orientation toward the future through four dimensions: valence (the extent to which an individual views the future as valuable and important to oneself), connectedness (the individual's ability to connect present actions with future goals), extension (the extent to which an individual projects thoughts toward the future), and speed (one's perception of the speed at which time passes) [18]. Accordingly, higher FTPS scores indicate a stronger future-oriented perspective across the four dimensions.

Climate Anxiety was measured using the Climate Anxiety Scale (CAS) developed by Clayton and Karazsia [10] and adapted into the Indonesian version by Jaro'ah and Saffana [19]. The CAS consists of 13 items with a Likert scale from 1 (never) to 5 (almost always). This scale comprises two dimensions: cognitive-emotional impairment (items 1–8) and functional impairment (items 9–13), which collectively describe the level of individual anxiety toward climate change and its impacts on daily life functioning. Higher CAS scores indicate a greater level of climate anxiety, reflecting more frequent cognitive-emotional and functional responses to climate change.

Variables and Measurement

The study involved three main variables: Future Time Perspective (FTP) as the independent variable, Climate Anxiety as the dependent variable, and gender as the moderating variable. FTP was operationalized through the total score of the 27-item FTPS, whereas Climate Anxiety was operationalized through the total score of the 13-item CAS.

The gender variable was categorized into two groups: the male group (coded as "1") and the female group (coded as "2"), serving as a categorical moderating variable in the analysis model. For the moderation analysis, gender was treated as a categorical variable to examine whether the relationship between FTP and Climate Anxiety differed between male and female participants.

Validity and Reliability

The validity and reliability of the research instruments were examined before the hypothesis testing. The FTPS and CAS were evaluated based on their psychometric properties to ensure that the instruments adequately measured Future Time Perspective and Climate Anxiety, respectively. The try-out design allowed these psychometric evaluations to be conducted using the same dataset as the main analysis.

Analysis Technique

Data analysis was performed using Moderator Analysis via JASP software to explore the contribution of Future Time Perspective to Climate Anxiety among Generation Z, while simultaneously examining the relationship between the two moderated by gender. Prior to conducting the moderator analysis, descriptive statistical analysis was first performed to observe the general overview of FTP and Climate Anxiety across gender groups, alongside multivariate normality testing using the Shapiro-Wilk Test and Pearson and Spearman correlation tests to ascertain initial relational patterns between FTP and Climate Anxiety before further testing via the moderation model. Descriptive statistics included the relevant measures of central tendency and variability for FTP and Climate Anxiety across gender groups. The Shapiro-Wilk test was used to assess the distributional characteristics of the data, while Pearson and Spearman correlation analyses were conducted to examine the initial association between FTP and Climate Anxiety.

Moderator analysis was conducted by incorporating Future Time Perspective, Gender, and the interaction between FTP×Gender as predictors of Climate Anxiety, to test the role of gender as a moderating variable in the relationship between FTP and climate anxiety. The moderation model can be expressed as Climate Anxiety = $\beta_0 + \beta_1(\text{FTP}) + \beta_2(\text{Gender}) + \beta_3(\text{FTP} \times \text{Gender}) + \varepsilon$. The interaction term (FTP × gender) was examined to determine whether gender significantly moderated the relationship between FTP and Climate Anxiety. A statistically significant interaction effect would indicate that the strength of the relationship between FTP and Climate Anxiety differs across gender groups.

Ethical Considerations

Ethical considerations were addressed throughout the data collection process. Before participating, respondents received information about the purpose and procedure of the study and provided informed consent. Participation was voluntary, and confidentiality of participant information was maintained. The collected data were used solely for research purposes, and identifying information was not disclosed in the reporting of the findings.

3. RESULTS AND DISCUSSION

3.1 Results

This section presents the findings obtained from the data analysis, including participant characteristics, descriptive statistics, normality testing, correlation analysis, and moderation analysis to examine the relationship between Future Time Perspective (FTP) and Climate Anxiety (CAS) and the moderating role of gender.

Descriptive Statistics

The results of the descriptive statistical analysis illustrate an overview of Future Time Perspective (FTP) and Climate Anxiety (CAS) scores across gender groups, as presented in Table 1.

Table 1. Descriptive statistics of Future Time Perspective (FTP) and Climate Anxiety (CAS) by gender

Statistic	FTP Male (1)	FTP Female (2)	CAS Male (1)	CAS Female (2)
Valid (N)	182	191	182	191
Mean	94.819	97.037	50.264	39.031
Std. Deviation	11.109	10.210	12.032	15.099
Skewness	-1.381	-1.109	-1.209	-0.086
Kurtosis	1.568	1.827	0.315	-1.275

Based on the data results in Table 1, the average FTP score in the female group (M = 97.037, SD = 10.210) is slightly higher compared to the male group (M = 94.819, SD = 11.109), indicating that females tend to have a stronger future orientation. Conversely, for the Climate Anxiety variable, the male group shows a higher average score (M = 50.264, SD = 12.032) compared to the female group (M = 39.031, SD = 15.099). These data results indicate that in this research sample, males actually exhibit a higher level of climate anxiety compared to females. Thus, within the present sample, males reported higher average Climate Anxiety scores than females, whereas females reported slightly higher average FTP scores than males. These descriptive differences provide an initial overview of the distribution of the two variables across gender groups but do not by themselves indicate whether the observed differences are statistically significant.

Normality Test

The results of the multivariate normality test using the Shapiro-Wilk Test showed a statistic value of 0.882 with $p < 0.001$ ($p < 0.05$), indicating that the data are not normally distributed. Therefore, the assumption of normality was not met. Based on these results, in addition to Pearson correlation, correlation analyses were supplemented with Spearman correlation as a non-parametric approach to ensure the consistency of relationship test results among variables. The use of both Pearson and Spearman correlation coefficients allowed the consistency of the observed relationship between FTP and Climate Anxiety to be assessed despite the non-normal distribution of the data.

Correlation Test

The results of the correlation test are presented in Table 2.

Table 2. Pearson and Spearman correlation test results between Future Time Perspective and Climate Anxiety

Variable	Pearson r	Pearson p	Spearman R	Spearman p
FTP-CAS	0.384***	< 0.001	0.350***	< 0.001

The correlation test results indicate a significant positive relationship between Future Time Perspective and Climate Anxiety variables, based on both the Pearson coefficient ($r = 0.384$, $p < 0.001$) and the Spearman coefficient (rho = 0.350, $p < 0.001$). This positive correlation value indicates that the higher an individual's future orientation,

the higher their perceived level of climate anxiety, and vice versa. The consistency of the positive and statistically significant results across both correlation methods indicates that the positive association between FTP and Climate Anxiety remains evident despite the non-normal distribution of the data. Based on relationship strength criteria, these correlation values fall into the weak to moderate category, indicating a positive association between Future Time Perspective and Climate Anxiety.

Moderation Test

Moderation regression analysis was conducted to examine the role of gender in the relationship between FTP and Climate Anxiety variables. The regression coefficients are presented in Table 3.

Table 3. Regression coefficients of the gender moderation model on the relationship between Future Time Perspective and Climate Anxiety

Predictor	B	SE	t	p
(Intercept)	-25.665	7.632	-3.363	< 0.001
FTP	0.801	0.080	10.016	< 0.001
Gender (2)	30.204	11.265	2.681	0.008
FTP × Gender (2)	-0.445	0.117	-3.818	< 0.001

The model summary results show an R2 value of 0.352, meaning that Future Time Perspective, gender, and the interaction between FTP × gender collectively explain 35.2% of the variance in Climate Anxiety. The significance test of the model using ANOVA yielded $F = 66.730$ with $p < 0.001$, indicating that the constructed moderation regression model is feasible for explaining the relationships among variables in this study. These results indicate that the overall moderation model is statistically significant and that the predictors included in the model collectively account for a substantial proportion of the observed variance in Climate Anxiety.

In the regression coefficient testing results, the main effect of the FTP variable on Climate Anxiety was 0.801 points and was statistically significant. Specifically, FTP had a positive and statistically significant regression coefficient ($B = 0.801$, $p < 0.001$), indicating that higher FTP scores were associated with higher Climate Anxiety scores. The main effect of gender was also significant ($B = 30.204$, $p = 0.008$), indicating differences in climate anxiety levels across gender groups, with gender contributing to climate anxiety variance beyond the influence of FTP.

The core of the moderation test is the FTP × Gender interaction coefficient, which shows a value of $B = -0.445$ with $p < 0.001$. A p-value smaller than 0.05 indicates that the interaction between FTP and gender significantly predicts Climate Anxiety, thus indicating that gender significantly moderates the relationship between future time perspective and climate anxiety. The negative interaction coefficient indicates that the influence of FTP on Climate Anxiety is stronger in males than in females. More specifically, because gender (2) represents the female group, the negative interaction coefficient indicates that the positive slope between FTP and Climate Anxiety is reduced by 0.445 points for females relative to males. Based on the regression coefficients, the estimated slope of FTP for males is 0.801,

whereas the estimated slope for females is 0.801 − 0.445 = 0.356. This indicates that an increase in FTP is associated with a greater increase in climate anxiety values among males, whereas females experience a relatively lower increase.

Hypothesis Testing Results

The first research objective was to examine the relationship between Future Time Perspective and Climate Anxiety among Generation Z. The correlation analysis showed a significant positive relationship between FTP and Climate Anxiety (Pearson $r = 0.384$, $p < 0.001$; Spearman rho = 0.350, $p < 0.001$). Therefore, the first hypothesis regarding a significant relationship between FTP and Climate Anxiety was supported.

The second research objective was to examine the role of gender as a moderating variable in the relationship between FTP and Climate Anxiety. The interaction between FTP and gender was statistically significant ($B = -0.445$, $p < 0.001$). Therefore, the second hypothesis regarding the moderating role of gender was supported.

Summary of Key Findings

Overall, the results demonstrate three main findings. First, females showed a slightly higher mean FTP score, whereas males showed a higher mean Climate Anxiety score. Second, FTP was positively and significantly associated with Climate Anxiety, with consistent results obtained from both Pearson and Spearman correlation analyses. Third, the FTP × Gender interaction was significant, indicating that gender moderated the relationship between FTP and Climate Anxiety. The positive association between FTP and Climate Anxiety was stronger among males than females in the present sample.

3.2 Discussion

The main results of this study indicate that future time perspective (FTP) has a significant positive relationship with Climate Anxiety among Generation Z in Indonesia. This finding suggests that future-oriented cognition is an important psychological factor in understanding individual differences in climate-related anxiety. This finding explains that the higher an individual's orientation toward the future, the higher their perceived anxiety regarding climate change. Rather than indicating that future orientation is inherently maladaptive, this result suggests that greater attention to future consequences may increase individuals' awareness and psychological sensitivity toward threats whose impacts are expected to unfold over time. This aligns with previous research findings presented by Tucholska et al. [13], which explain that individuals with high FTP possess stronger mental representations of the future and are more focused on the long-term consequences of an event. This includes the impacts of climate change, the majority of which will be experienced in the unforeseeable future. From the perspective of future-oriented cognition, individuals who more strongly connect present circumstances with future consequences may therefore devote greater cognitive attention to climate-related threats. This cognitive tendency makes individuals with high FTP more prepared to anticipate future environmental threats, thereby triggering emotional responses in the form of anxiety regarding the future condition of the Earth's environment. Thus, the positive association

observed in this study can be interpreted as a consequence of heightened future-oriented awareness: the more salient future consequences become in an individual's mental representation, the greater the potential for climate-related threats to elicit anxiety.

The results of this study are also relevant to previous findings presented by Clayton [10], which explain that climate change possesses unique characteristics as an environmental stressor: it is continuously evolving and persistent, hindering simple adaptation efforts, while posing massive and global threats. These characteristics help explain why FTP may be particularly relevant to climate anxiety rather than to environmental concerns in general. Climate change involves temporally extended and uncertain consequences, requiring individuals to project themselves into the future to evaluate potential outcomes mentally. These characteristics are likely to be strongly perceived by individuals with a strong future orientation, as they cognitively contemplate the long-term effects of such threats more than individuals with lower future time orientation. Accordingly, the present finding extends the relevance of FTP from a general time-perspective construct to a specific climate-related psychological context, suggesting that temporal orientation may be particularly meaningful when long-term, uncertain, and difficult-to-control consequences characterize the stressor itself.

The findings regarding gender moderating the relationship between FTP and Climate Anxiety provide an important contribution to the development of climate and environmental psychology studies. More specifically, the significant FTP × Gender interaction indicates that the association between future-oriented cognition and climate anxiety is not uniform across gender groups. The direction of moderation in this study indicates that the influence of FTP on Climate Anxiety is stronger in males than in females. This result is interesting because it differs from patterns in previous research suggesting that females, on average, tend to have higher climate anxiety compared to males, particularly in aspects of more intense emotional responses and difficulty concentrating [14]. In this study, the male group actually exhibited higher climate anxiety, and the effect of FTP on climate anxiety was also stronger within this group. The finding therefore does not simply demonstrate a gender difference in the mean level of climate anxiety; it indicates a difference in the way future-oriented cognition is associated with climate anxiety across gender groups. This distinction is theoretically important because gender may function not only as a demographic characteristic associated with different anxiety levels but also as a contextual factor that changes the strength of the relationship between a cognitive orientation and a climate-related emotional response.

This difference can be explained through several possibilities. First, the characteristics of this study's sample focused on Generation Z in Indonesia, thus possessing a different cultural and social context from previous studies conducted predominantly in Western countries [15]. In a cross-national study by Tsevreni et al. [20] on climate anxiety among Generation Z, it was also explained that the level and expression of worry regarding climate change are heavily influenced by the social, cultural, and educational contexts of respective countries, underscoring the importance of local context in interpreting these research findings. Therefore, the discrepancy between the present findings and previous evidence regarding gender differences should not necessarily be interpreted as

contradictory evidence, but rather as an indication that the relationship between gender and climate anxiety may be context-dependent. Differences in social norms regarding emotional expression between females and males within the Indonesian cultural context may influence the climate anxiety experienced by each gender group. Such contextual factors may shape how individuals recognize, express, and regulate climate-related concerns, although the present study did not directly measure these mechanisms.

Second, this finding can also be explained through differences in cognitive patterns when interpreting future threats. When males in this sample possess a stronger tendency to directly link future orientation with existential threats such as the climate crisis, an increase in FTP will serve as a stronger trigger for anxiety in this group compared to females, whose responses to climate anxiety are likely influenced by other factors, such as social or relational concerns, rather than purely cognitive time orientation. This explanation should be interpreted cautiously because the present study did not directly assess cognitive appraisal, existential threat perception, social concerns, or emotional-expression norms. Nevertheless, the moderation result provides an empirical basis for proposing that the pathway from future-oriented cognition to climate anxiety may operate differently across gender groups. Future research should therefore test these proposed mechanisms directly rather than assuming them from gender differences alone.

The results of the moderation analysis reinforce the argument that climate anxiety cannot be understood as being caused by a single psychological factor alone, but rather through the interaction between cognitive factors like Future Time Perspective and individual characteristics like gender [14, 15]. The theoretical contribution of this finding is more specific than simply demonstrating that multiple variables are associated with climate anxiety. The present study suggests that the psychological meaning of future orientation may depend partly on individual characteristics, with gender altering the strength of the association between future-oriented cognition and climate-related anxiety. Thus, climate anxiety can be conceptualized not only as a direct psychological response to climate threats but also as an outcome shaped by the interaction between how individuals mentally represent the future and characteristics that may influence how those representations are processed. These findings are also consistent with general concepts in psychological research stating that moderating variables can cause changes in the strength and significance of the relationship between independent and dependent variables, meaning that models incorporating interactions between variables yield a deeper understanding compared to studies discussing only direct relationships [21, 22]. In this sense, the moderation model contributes to the literature by identifying a conditional relationship rather than assuming that the association between FTP and climate anxiety is identical for all individuals.

In previous research by Gousse-Lessard and Lebrun-Paré [17], it was also explained that research on eco-anxiety requires the simultaneous involvement of psychological, educational, and social perspectives, given that this issue is shaped by complex interactions between individual factors and the socio-cultural context in which individuals live. The results of this study also reinforce global findings by Hickman et al. [23] regarding young people in ten countries, showing that the majority of respondents reported feeling anxious,

frightened, and helpless regarding climate change, with intensity levels varying according to demographic characteristics such as gender and country of residence. The present findings extend this perspective by showing that demographic characteristics may be relevant not only to differences in the level of climate anxiety but also to the relationship between a cognitive predictor and climate anxiety. This provides a more conditional view of climate anxiety and supports the importance of examining psychological processes together with individual and contextual characteristics.

Interestingly, these findings differ from the results of Ardelia and Jaro'ah [24], who utilized moderation analysis to examine the effect of social media use on climate anxiety among emerging adults in Indonesia and revealed that the gender variable did not moderate the relationship significantly. These differing findings indicate that the role of gender as a moderator in climate anxiety dynamics is contextual and depends on the predictor being tested. This distinction is important because it suggests that the moderating role of gender should not be generalized across all predictors of climate anxiety. In the findings of Ardelia and Jaro'ah [24], the intensity of information exposure on social media tends to be experienced relatively equally by both males and females due to equal access to the same platforms, meaning the gender moderating variable did not heavily influence the strength of its relationship with Climate Anxiety. Conversely, in the present study, FTP is a cognitive-motivational construct primarily influenced by internal individual processes and can be interpreted and processed differently by males and females, creating an opportunity for the gender variable to act as a significant moderator. Thus, the difference between the two studies may indicate that the relevance of gender moderation depends partly on the psychological nature of the predictor: social-media exposure represents an externally mediated information-related factor, whereas FTP represents an internally oriented cognitive tendency concerning the future. This comparison highlights the necessity of considering the type of predictor when testing the role of gender as a moderating variable, particularly in climate anxiety research. Future studies comparing multiple predictors within the same sample could further determine whether gender consistently moderates cognitive predictors more strongly than externally driven predictors of climate anxiety.

From a practical standpoint, this study has important implications for developing psychological interventions to address climate anxiety, particularly among Generation Z. Salguero et al. [25] explain that for Generation Z, climate anxiety requires greater attention not only through individual interventions but also through collective efforts and policies that provide a sense of control over the climate issues they face. Consistent with the findings of this study that the influence of FTP on Climate Anxiety is stronger in males, interventions designed to help individuals manage their anxiety regarding the climate future must consider gender factors in their approach, rather than implementing a uniform approach without regard to target group characteristics. However, the findings should not be interpreted as indicating that males universally require greater intervention than females. Rather, they suggest that interventions targeting future-oriented climate concerns may benefit from considering differences in how future threats are cognitively processed across gender groups. Furthermore, because the relationship between FTP and climate anxiety in this study is categorized as moderate, psychoeducational interventions focusing on the

development of adaptive time orientation—the ability to remain future-oriented without excessive anxiety—can serve as a relevant strategy for the younger generation. Such interventions may focus on helping individuals maintain awareness of long-term climate consequences while developing adaptive coping strategies and a sense of personal or collective agency. At the broader level, educational institutions and policymakers may also consider providing opportunities for young people to transform climate concerns into constructive actions, thereby reducing feelings of helplessness associated with future environmental threats.

These findings present certain limitations requiring consideration when interpreting the results. First, the correlational research design does not permit causal conclusions regarding the relationship between FTP and climate anxiety. Second, the use of purposive sampling limits the generalization of the research findings to the overall Generation Z population. Third, the FTP instrument in this study yielded an acceptable reliability level but not as high as the CAS instrument (alpha = 0.713 compared to alpha = 0.974); this condition indicates the need for a re-evaluation of item suitability within the Indonesian cultural context. Fourth, this study has not examined the potential roles of other moderating or mediating variables. The use of gender as the sole moderating variable in a binary form leaves other potentially relevant factors, such as educational level, geographical location, and involvement in environmental activism, unexplored. In addition, the cross-sectional nature of the data prevents examination of how FTP and climate anxiety may change over time, which is particularly relevant because both future-oriented cognition and perceptions of climate threats may evolve as individuals encounter new information and environmental experiences. Considering these factors in future research is expected to provide a more comprehensive understanding of the dynamics of climate anxiety among Generation Z in Indonesia.

Suggestions for Future Research

Future research should address these limitations by employing probability-based or more diverse sampling strategies, longitudinal designs, and broader conceptual models. In particular, future studies could examine potential mediating mechanisms such as climate-threat appraisal, perceived control, coping strategies, and environmental concern, as well as moderating factors such as cultural context, educational background, geographical exposure to climate-related hazards, and environmental engagement. Comparative research across countries or cultural contexts would also be valuable for determining whether the gender moderation observed in the present study is specific to the Indonesian context or represents a broader pattern.

4. CONCLUSION

This study aimed to examine the relationship between Future Time Perspective (FTP) and Climate Anxiety among Generation Z in Indonesia and to determine whether gender moderates this relationship. The findings demonstrate that Future Time Perspective has a significant positive relationship with Climate Anxiety among Generation Z in Indonesia ($r = 0.384$, $p < 0.001$), meaning that the higher an individual's orientation toward

the future, the higher their perceived level of climate change anxiety. More in-depth moderation analysis indicates that gender significantly moderates this relationship (B = -0.445, $p < 0.001$), with the positive association between FTP and climate anxiety being stronger in the male gender group compared to the female gender group. The regression model incorporating FTP, gender, and their interaction accounts for 35.2% of the variance in climate anxiety ($R2 = 0.352$, $F = 66.730$, $p < 0.001$).

The research findings provide theoretical contributions by combining cognitive factors in the form of time orientation and individual characteristics in the form of gender within a single model to analyze climate anxiety, while addressing research gaps in developing country contexts that remain minimally studied. More specifically, the findings contribute to the literature by demonstrating that the relationship between future-oriented cognition and climate anxiety is conditional on gender, suggesting that the psychological relevance of future time perspective may differ across individual characteristics and contexts. Practically, the results of this study suggest that future psychological and educational approaches to climate anxiety may benefit from considering differences in how future-oriented climate concerns are experienced across gender groups. However, the present findings do not establish the effectiveness of gender-specific interventions, and therefore should be considered as a basis for developing and testing more context-sensitive intervention approaches rather than as evidence for validated gender-specific treatment strategies. Future studies are recommended to explore other moderating or mediating variables, such as involvement in environmental activism and social support, as well as to employ longitudinal designs to examine causal relationships among variables. Future research should also use more diverse or probability-based samples to improve generalizability and investigate whether the moderating role of gender remains consistent across different Indonesian regions and cultural contexts.

This study has several limitations that should be considered when interpreting its findings. The correlational and cross-sectional design does not permit causal conclusions, while purposive sampling limits the generalizability of the findings to the broader Generation Z population in Indonesia. In addition, the study examined gender as a binary moderating variable and did not include other potentially relevant psychological and contextual factors. Therefore, the findings should be interpreted as evidence of an association and moderation pattern rather than causal evidence.

REFERENCES

[1] D. G. Rosalia Silalahi, “Analisis Perkembangan Batas Laut Indonesia di Wilayah Perairan Indonesia, Menurut Hukum Laut Indonesia maupun Hukum Laut Internasional,” *Jurnal Hukum Indonesia*, vol. 2, no. 2, pp. 60–74, Apr. 2023, doi: 10.58344/jhi.v2i2.23.

[2] A. Varrani and M. Nones, “Vulnerability, impacts and assessment of climate change on Jakarta and Venice,” *International Journal of River Basin Management*, vol. 16, no. 4, pp. 439–447, Oct. 2018, doi: 10.1080/15715124.2017.1387125.

[3] F. Rimba and A. Putri, “TREN PENELITIAN DAN JARINGAN PENGETAHUAN KECEMASAN EKOLOGIS (ECOANXIETY): ANALISIS BIBLIOMETRIK MENGGUNAKAN VOSVIEWER (2018-2024),” vol. 8, no. 1, pp. 29–46, 2025, doi: 10.55981/panalungtik.2023.13662.

[4] S. I. Nasution, R. Purnama, and V. D. Puspita, “Peran Persepsi Risiko Lingkungan sebagai Mediator Dalam Hubungan antara Eco-Anxiety Dan Perilaku Pro-Lingkungan di Kalangan Gen Z di Lampung,” *PSIKODIMENSIA*, vol. 24, no. 2, pp. 172–186, Dec. 2025, doi: 10.24167/psidim.v24i2.14410.

[5] K. Chelminski, "Climate Finance Effectiveness: A Comparative Analysis of Geothermal Development in Indonesia and the Philippines," *Journal of Environment and Development*, vol. 31, no. 2, pp. 139–167, Jun. 2022, doi: 10.1177/10704965211070034.

[6] F. Yunanto and E. N. Sa'adiyah Sy, "Archipelagic Eco-Futures: Eco-anxiety dan Harapan Ekologis dalam Fiksi Iklim Indonesia dan Filipina," *GHANCARAN: Jurnal Pendidikan Bahasa dan Sastra Indonesia*, pp. 783–793, Sep. 2025, doi: 10.19105/ghancaran.vi.21619.

[7] P. Baudon and L. Jachens, "A scoping review of interventions for the treatment of eco-anxiety," Sep. 01, 2021, *MDPI*. doi: 10.3390/ijerph18189636.

[8] C. Flynn and S. Jardon, "Peoples' Climate Vote 2024," Jun. 2024. Accessed: Jun. 22, 2026. [Online]. Available: https://www.undp.org/publications/peoples-climate-vote-2024

[9] J. Beckord *et al.*, "Development and validation of a climate change version of the man-made disaster-related distress scale (CC-MMDS)," *Journal of Climate Change and Health*, vol. 20, Nov. 2024, doi: 10.1016/j.joclim.2024.100356.

[10] S. Clayton, "Climate anxiety: Psychological responses to climate change," *J. Anxiety Disord.*, vol. 74, Aug. 2020, doi: https://doi.org/10.1016/j.janxdis.2020.102263.

[11] T. Léger-Goodes, C. Malboeuf-Hurtubise, M. Généreux, P.-O. Paradis, and C. Camden, "Eco-anxiety in children: A scoping review of the mental health impacts of the awareness of climate change," Jul. 2022. doi: https://doi.org/10.3389/fpsyg.2022.872544Eco.

[12] P. G. Zimbardo and J. N. Boyd, "Putting Time in Perspective: A Valid, Reliable Individual-Differences Metric," 2014. doi: https://doi.org/10.1007/978-3-319-07368-2_2.

[13] K. Tucholska, B. Gulla, and A. Ziernicka-Wojtaszek, "Climate change beliefs, emotions and proenvironmental behaviors among adults: The role of core personality traits and the time perspective," *PLoS One*, vol. 19, no. 4 April, Apr. 2024, doi: 10.1371/journal.pone.0300246.

[14] K. Closson *et al.*, "Gender Differences in Climate Change Anxiety," Jul. 2022. [Online]. Available: https://ssrn.com/abstract=4168583

[15] Y. Coffey, N. Bhullar, J. Durkin, M. S. Islam, and K. Usher, "Understanding Eco-anxiety: A Systematic Scoping Review of Current Literature and Identified Knowledge Gaps," Aug. 01, 2021, *Elsevier Masson s.r.l.* doi: 10.1016/j.joclim.2021.100047.

[16] N. Laily Mucharomah and Y. Luqman, "PENGARUH TERPAAN MEDIA TERKAIT PERUBAHAN IKLIM DAN SELF-EFFICACY TERHADAP TINGKAT ECO-ANXIETY PADA GENERASI Z DI INDONESIA," 2024. Accessed: Jul. 27, 2026. [Online]. Available: https://ejournal3.undip.ac.id/index.php/interaksi-online/article/view/48826

[17] A.-S. Gousse-Lessard and F. Lebrun-Paré, "Regards croisés sur le phénomène « d'écoanxiété » : perspectives psychologique, sociale et éducationnelle," 2022. [Online]. Available: http://journals.openedition.org/ere/8159

[18] J. Husman and D. F. Shell, "Beliefs and perceptions about the future: A measurement of future time perspective," *Learn. Individ. Differ.*, vol. 18, no. 2, pp. 166–175, Jun. 2008, doi: 10.1016/j.lindif.2007.08.001.

[19] S. Jaro'ah and K. Saffana, "Adaptation of the Climate Anxiety Scale in Indonesian version: The sample of young adults," *Psikohumaniora*, vol. 8, no. 2, pp. 309–327, Nov. 2023, doi: 10.21580/pjpp.v8i2.17462.

[20] I. Tsevreni, N. Proutsos, M. Tsevreni, and D. Tigkas, "Generation Z Worries, Suffers and Acts against Climate Crisis—The Potential of Sensing Children's and Young People's Eco-Anxiety: A Critical Analysis Based on an Integrative Review," Aug. 01, 2023, *Multidisciplinary Digital Publishing Institute (MDPI)*. doi: 10.3390/cli11080171.

[21] F. Baier, A. T. Decker, T. Voss, T. Kleickmann, U. Klusmann, and M. Kunter, "What makes a good teacher? The relative importance of mathematics teachers' cognitive ability, personality, knowledge, beliefs, and motivation for instructional quality," *British Journal of Educational Psychology*, vol. 89, no. 4, pp. 767–786, Dec. 2019, doi: 10.1111/bjep.12256.

[22] S. F. Cheung and M. Aguiar, "Doing, Reporting, and Interpreting Moderation Right: Recommendations for Selected Common Practices," *Journal of Pacific Rim Psychology*, vol. 19, Jan. 2025, doi: 10.1177/18344909251374823.

[23] C. Hickman *et al.*, "Climate anxiety in children and young people and their beliefs about government responses to climate change: a global survey," *Lancet Planet. Health*, vol. 5, no. 12, pp. e863–e873, Dec. 2021, doi: 10.1016/S2542-5196(21)00278-3.

[24] V. Ardelia and S. Jaro'ah, "Digital Threat: The Influence of Social Media Use on Climate Anxiety in Emerging Adulthood Moderated by Gender," *Psikologika: Jurnal Pemikiran dan Penelitian Psikologi*, vol. 30, no. 1, pp. 149–162, Jan. 2025, doi: 10.20885/psikologika.vol30.iss1.art9.

[25] R. B. Salguero, D. Bogueva, and D. Marinova, "Australia's university Generation Z and its concerns about climate change," *Sustainable Earth Reviews*, vol. 7, no. 1, Mar. 2024, doi: 10.1186/s42055-024-00075-w.