

Moral emotions over dark personalities: Replicating “Attitudes towards global warming: The role of anticipated guilt and the Dark Triad traits”



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Abstract ■ The present study is a replication of Pitirut and colleagues (2022) [Attitudes towards global warming: The role of anticipated guilt and the Dark Triad traits. *Personality and Individual Differences*, 185, 111285.], who found that anticipated guilt positively predicted attitudes toward global warming while Dark Triad traits predicted them negatively in Romanian undergraduates. Using a more geographically diverse community sample ($N = 202$), we partially replicated the original findings. Anticipated guilt remained a significant positive predictor of global warming attitudes. However neither the Dark Triad total score nor any of its subscales predicted attitudes towards global warming. Discrepancies are discussed in terms of ceiling effects, sample characteristics, and measurement differences between instruments measuring traits related to the Dark Triad.

Keywords ■ Anticipated guilt; Dark Triad; Global warming attitudes; replication study.

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Introduction

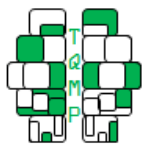
Climate change has severe implications for mental and physical health (Clayton, 2020), and understanding the psychological factors that influence individuals' attitudes toward global warming has become an important area of research. Attitudes toward global warming refer to the degree to which individuals agree with expert scientific conclusions on climate change, with more favourable attitudes reflecting greater acceptance of human-caused warming and its consequences (Sinatra et al., 2012). These attitudes are relevant because they are associated with pro-environmental behavioural intentions (Bradley et al., 2020; Mõnus, 2021), and identifying their personality and emotional predictors can inform climate change communication and mitigation efforts.

Anticipated guilt, defined as the prospective emotional discomfort of failing to act in accordance with one's moral values, has emerged as a meaningful predictor of pro-environmental intentions (Schneider et al., 2017). When individuals anticipate feeling guilty about not acting to miti-

gate global warming, they report more favourable attitudes toward climate change and stronger intentions to engage in pro-environmental behaviours (Jiang et al., 2020). This association reflects the larger role of moral emotions in bridging environmental concern and action (Knez, 2016).

In contrast, Dark Triad personality traits (i.e., Machiavellianism, narcissism, and psychopathy) are associated with reduced empathy, social aversion, and disengagement from collective moral concerns (Furnham et al., 2013). Given that climate change is fundamentally a moral and collective issue (Knez, 2016), individuals high on these traits may be especially resistant to developing favourable attitudes toward global warming. Consistent with this reasoning, Huang et al. (2019) found negative associations between Dark Triad traits and environmental attitudes, with Machiavellianism and psychopathy driving the effect while narcissism was non-significant.

Building on these lines of research, a study by Pitirut et al. (2022) combined these two lines of research together by examining attitudes toward global warming as a function of both anticipated guilt and Dark Triad traits. In a sam-

**Table 1** ■ Means, standard deviations, and alpha coefficients ($N = 202$)

Scales	Mean	(SD)	Alpha
Attitudes towards global warming	60.03	(4.84)	.82
Anticipated guilt	9.90	(3.62)	.85
Short Dark Triad	65.13	(12.72)	.82
Machiavellianism	25.88	(6.20)	.80
Narcissism	21.09	(5.74)	.73
Psychopathy	18.17	(5.16)	.66

ple of 201 Romanian undergraduate students, they found that anticipated guilt positively predicted global warming attitudes ($\beta = .19, p < .01$), while the Dark Triad as a whole predicted them negatively ($\beta = -.18, p < .01$), together explaining 6% of the variance. When the three Dark Triad subscales were entered separately, Machiavellianism ($r = -.14, p < .05$) and psychopathy ($r = -.17, p < .01$) were independently associated with less favourable attitudes, while narcissism was not. The authors concluded that the Dark Triad functions as a unified negative predictor and that anticipating guilt represents an important driver of climate-relevant attitudes.

The present study is a direct replication of Pitiruş et al. (2022) using a more geographically diverse sample ($N = 202$) recruited online, which includes participants from multiple countries and a broader age range than the original undergraduate sample. Replication with a more diverse community sample is particularly important given that attitudes toward global warming vary across cultural and socioeconomic contexts (Bradley et al., 2020). Consistent with Pitiruş et al. (2022), we hypothesize that anticipated guilt will be positively associated with attitudes toward global warming and that Dark Triad traits will predict them negatively, similar to the effect of anticipated guilt.

Method

Participants

A total of $N = 202$ participants were recruited through reddit.com/r/SampleSize, a community platform commonly used to recruit participants for academic research. The mean age of participants was 39.26 years ($SD = 13.21$). The sample included 85 women (42%), 101 men (50%), and 16 participants who identified as other or did not specify their gender (8%). Most participants were located in North America (56%) or Europe (33%). In terms of highest level of education achieved, most participants reported having obtained a bachelor's degree (40%) or a graduate degree (29%), with 83% reporting not being currently enrolled as a university student. Lastly, approximately 87% of participants reported being personally affected by climate change.

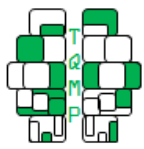
Material and Procedure

Similar to the original study by Pitiruş et al. (2022), the present study used a cross-sectional web-based survey design. The Attitudes towards global warming scale (Sinatra et al., 2012) and the Anticipated guilt questionnaires (Roseman et al., 1994; Wang & Lin, 2018) were re-used as-is. However, we used a different measure for Dark Triad traits. The original study by Pitiruş et al. (2022) used the 12-item Dirty Dozen (jw10), which allocates only four items per subscale (i.e., Machiavellianism, psychopathy, and narcissism). For the present study, Dark Triad traits were measured using the Short Dark Triad (SD3; Jones & Paulhus, 2014). The SD3 includes 27 items, assessing once again Machiavellianism (9 items; e.g., "It's not wise to tell your secrets"), narcissism (9 items; e.g., "I know that I am special because everyone keeps telling me so"), and psychopathy (9 items; e.g., "People who mess with me always regret it"). Previous studies have suggested that the SD3 has stronger convergent and discriminant validity than the Dirty Dozen (Maples et al., 2014).

Results

Table 1 provides descriptive statistics for the instruments used in the present study. Cronbach's alphas of the present study were consistent with those reported by Pitiruş et al. (2022). The authors previously reported an alpha of $\alpha = .75$ for the Attitudes towards global warming scale, $\alpha = .86$ for the Anticipated guilt questionnaire, $\alpha = .84$ for the entire scale of the Dirty Dozen, and $\alpha = .77, .85$, and $.64$ for Machiavellianism, narcissism, and psychopathy respectively.

Gender was negatively associated with anticipated guilt ($r = -.27, p < .001$), indicating that women anticipated more guilt about not taking action to mitigate global warming than men. Age was negatively associated with Machiavellianism ($r = -.26, p < .001$), suggesting that younger participants scored higher on this trait. Gender was positively associated with all three Dark Triad subscales, with men scoring higher than women on Machiavellianism ($r = .21, p < .01$), narcissism ($r = .26, p < .001$), and psychopathy ($r = .30, p < .001$).

**Table 2** ■ Bivariate correlations among variables

	1	2	3	4	5	6	7
1. Gender							
2. Age	.06						
3. Anticipated guilt	-.27***	.05					
4. The Dark Triad	.34***	-.13	-.21***				
5. Machiavellianism	.21**	-.26***	-.25***	.77***			
6. Psychopathy	.30***	-.06	-.12	.76***	.43***		
7. Narcissism	.26***	.05	.09	.70***	.24***	.33***	
8. Attitudes towards global warming	.10	.12	.19**	-.12	-.13	-.09	-.06

Note. * $p < .05$, ** $p < .01$, *** $p < .001$. Gender is coded as Female = 0; Male = 1. Participants identifying as other or not specifying gender ($n = 17$) were excluded from gender-related analyses.

Favourable attitudes toward global warming were positively associated with anticipated guilt ($r = .19$, $p < .01$). However, favourable attitudes were not significant when compared to age nor the Dark Triad or any of its individual trait. In contrast, anticipated guilt was negatively associated with the Dark Triad ($r = -.21$, $p < .01$) and with Machiavellianism ($r = -.25$, $p < .001$).

Regression Analysis

A hierarchical regression analysis was conducted to examine whether anticipated guilt and Dark Triad traits predicted attitudes toward global warming (see Table 3). In Step 1, anticipated guilt and the Dark Triad total score were entered simultaneously. Anticipated guilt positively predicted attitudes toward global warming ($\beta = .17$, $p < .05$), while the Dark Triad did not reach significance ($\beta = -.09$, $p = .234$). Together, the two predictors explained 4.3% of the variance in attitudes toward global warming ($\Delta R^2 = .043$, $F(2, 199) = 4.48$, $p < .05$).

In Step 2, the three Dark Triad subscales (Machiavellianism, narcissism, and psychopathy) were added to the model. None of the subscales were significant predictors, and the addition of the three subscales produced no meaningful increase in explained variance ($\Delta R^2 = .001$, $F_{change}(3, 197) = 0.07$, $p = .978$). Anticipated guilt remained the only significant predictor across both steps ($\beta = .17$, $p < .05$).

Discussion

The present study sought to replicate the findings of Pitiruş et al. (2022) in a more geographically diverse community sample. Consistent with the original study, anticipated guilt positively predicted attitudes toward global warming. However, contrary to the original findings, neither the Dark Triad as a whole nor any of its individual subscales were significantly associated with global warming attitudes in the present sample. These results provide partial support for the original findings and suggest that the

role of Dark Triad traits in predicting environmental attitudes may be less robust than previously reported.

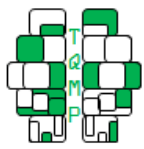
Anticipated Guilt and Attitudes toward Global Warming

The positive association between anticipated guilt and attitudes toward global warming replicates the original finding of Pitiruş et al. (2022) and is consistent with the broader literature on moral emotions and pro-environmental behaviour (Knez, 2016; Schneider et al., 2017). Individuals who anticipate feeling guilty about failing to act on climate change tend to hold more favourable attitudes toward global warming, suggesting that moral self-regulation plays a meaningful role in shaping climate-relevant cognitions. This finding held across both steps of the hierarchical regression, indicating that anticipated guilt is a robust predictor of global warming attitudes even when accounting for personality traits. The replication of this effect in a diverse community sample strengthens confidence in its generalizability beyond undergraduate student populations.

Dark Triad Traits and Attitudes toward Global Warming

In contrast to the original findings, the Dark Triad total score and its subscales were not significantly associated with attitudes toward global warming in the present sample. This diverges from Pitiruş et al. (2022), who found that Machiavellianism and psychopathy were both negatively associated with global warming attitudes, and from Huang et al. (2019), who similarly reported negative associations between Dark Triad traits and environmental attitudes. Several explanations may account for this discrepancy.

First, sample characteristics likely played a role. The original study relied on Romanian undergraduate students, a more homogeneous group, whereas the present sample was drawn from Reddit and included participants from multiple countries across a broader age range. Atti-

**Table 3** ■ Hierarchical regression results for the Dark Triad and anticipated guilt predicting attitudes toward global warming.

	Attitudes toward global warming					
	Step 1			Step 2		
	B	SE	β	B	SE	β
Anticipated Guilt	0.23	0.10	.17*	0.23	0.10	.17*
Dark Triad	-0.03	0.03	-.09			
Machiavellianism				-0.05	0.06	-.07
Narcissism				-0.01	0.06	-.01
Psychopathy				-0.03	0.08	-.03
ΔR^2		0.043			0.001	
R^2 change					0.001	
R		0.207*			0.210	

Note. $N = 202$. * $p < .05$.

tudes toward global warming tend to be more uniformly favourable in online communities engaged with climate-related content, which may have reduced the variability needed to detect associations with personality traits. The restricted range of global warming attitudes scores in the present sample ($M = 60.03$, $SD = 4.84$, out of a maximum of 65) was further reflected in a negatively skewed distribution ($skewness = -1.363$, $kurtosis = 1.387$), confirming that the majority of participants endorsed highly favourable climate attitudes. This ceiling effect would directly attenuate observed correlations with personality predictors, as range restriction reduces the statistical power to detect true associations even when they exist in the population (Cohen et al., 2003).

Second, the use of a different Dark Triad measure may have contributed to the discrepancy. The original study employed the Dirty Dozen (JW10), a 12-item measure, whereas the present study used the Short Dark Triad (SD3; Jones & Paulhus, 2014), a 27-item instrument with stronger psychometric properties and better discriminant validity between subscales (Maples et al., 2014). It is possible that the broader and more refined item coverage of the SD3 captures a slightly different construct profile than the Dirty Dozen, particularly for psychopathy, which showed the greatest difference between the two studies.

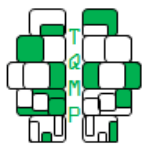
Third, the negative association observed between anticipated guilt and the Dark Triad ($r = -.21$, $p < .01$) and Machiavellianism specifically ($r = -.25$, $p < .001$) suggests that in the present sample, individuals high on Dark Triad traits simply anticipated less guilt about climate inaction. When both variables were entered simultaneously in the regression, the shared variance between anticipated guilt and the Dark Triad may have further attenuated the independent contribution of Dark Triad traits to global warming attitudes. It is also worth noting that sev-

eral of the original correlations reported by Pitiruş et al. (2022) were themselves modest in magnitude and barely reached conventional significance thresholds (e.g., Machiavellianism: $r = -.14$, $p < .05$; psychopathy: $r = -.17$, $p < .01$). In the present study, the corresponding correlations were numerically similar (Machiavellianism: $r = -.13$; psychopathy: $r = -.10$), suggesting that the underlying effect sizes may not differ substantially between the two samples. Rather than reflecting a true absence of association, the non-significant results in the present study may reflect insufficient statistical power to detect small effects, compounded by the ceiling effect in global warming attitudes scores. This interpretation is consistent with the view that replication failures involving small original effects should be interpreted cautiously, as they may reflect sampling variability rather than genuine construct-level discrepancies (Collaboration, 2015).

Limitations and Future Directions

Several limitations of the present study should be noted. First, the ceiling effect in global warming attitudes scores substantially limits the variability of the outcome variable, reducing statistical power and making it more difficult to detect associations. Future studies replicating this line of research should consider recruiting samples with more heterogeneous climate attitudes, potentially by targeting communities with a broader range of environmental engagement. Second, the cross-sectional design prevents causal inferences about the relationships observed. Third, although the Reddit recruitment strategy yielded a more diverse sample than the original undergraduate population, participants were self-selected and likely more environmentally aware than the general population, which limits the generalizability of the findings.

Future research should examine these associations in



more representative community samples with greater variability in climate attitudes. Additionally, given the discrepant findings across the two Dark Triad measures, a direct comparison of the Dirty Dozen and the SD3 within the same sample would help clarify whether measurement differences account for the divergent results.

Conclusion

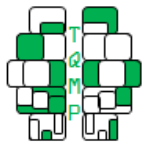
The present study partially replicates the findings of Pitirut et al. (2022) in a more diverse community sample. The positive effect of anticipated guilt on attitudes toward global warming was successfully replicated, supporting the role of moral emotions in shaping climate-relevant attitudes. However, the negative effects of Dark Triad traits were not replicated, likely due to a combination of ceiling effects in the outcome variable, sample characteristics, and differences in measurement. These findings underscore the importance of replication studies with diverse samples and highlight the need to account for sample-level variability when drawing conclusions about the personality predictors of environmental attitudes.

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Open practices

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Citation

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