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On the relation between boredom and social behavior: A registered report

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ABSTRACT

Boredom plays an essential role in everyday life and is a powerful motivator. This registered report investigated the interpersonal consequences of boredom. We recruited participants online ($N = 3568$) and ran one experiment manipulating boredom with three variations of behavioral options as dependent variables: 1) prosocial and non-social, 2) antisocial and non-social, and 3) prosocial, antisocial, and non-social. First, we tested whether boredom increases the likelihood of individuals engaging in any type of behavior, including both social and non-social alternatives. We found no significant main effect of boredom on behavior. Second, we tested whether boredom increases the likelihood of individuals engaging in prosocial or antisocial behavior. No clear evidence emerged for a total effect of boredom on prosocial or antisocial behavior. Moderation analyses revealed no significant effect of the prosocial personality trait Honestly-Humility, and the antisocial personality trait D. In addition, mediation analyses showed that boredom reduces individuals' sense of agency, which in turn is associated with increased prosocial and antisocial behavior; boredom also reduces a sense of meaning, which in turn relates to increased prosocial behavior when only this social option is presented. Overall, this study examined the motivational aspect of boredom with regard to social behavior and the role of personality traits as moderators and lack of agency and meaning as mediators.

Kate Greene, a freelance journalist who spent 4 months in a simulated Mars mission wrote, "My time on Mars showed me the light and dark side of boredom" (Greene, 2023). This dual nature of boredom is also present in our scientific understanding of this emotion and its consequences. On one hand, past research suggests that boredom may motivate people to engage in prosocial behaviors (Van Tilburg & Igou, 2017). On the other hand, past work states that boredom promotes antisocial behaviors (Pfattheicher et al., 2021). The current study aimed to examine the interpersonal consequences of boredom. We tested whether boredom signals a desire to change behavior (Bench & Lench, 2013) and therefore leads to an increase in the likelihood of engaging in any type of behavior. Furthermore, based on the idea that everyday boredom is grounded in a mixture of missing meaning and stimulation, we tested whether boredom might promote prosocial and antisocial behaviors, as these actions might reestablish stimulation and meaning.

This registered report offers several contributions to the existing literature. First, we focused on interpersonal behavior. Although research exists that relates (maladaptive) intrapersonal behavior and boredom (Chapman & Dixon-Gordon, 2007; Mercer & Eastwood, 2010; Nederkoorn et al., 2016), the interpersonal consequences of boredom (in a causal sense) have not been adequately studied (cf. Pfattheicher et al., 2021; Van Tilburg & Igou, 2016). This subject is of crucial importance as it touches upon everyday lives. In fact, most people experience boredom at least once a week (Chan et al., 2018; Goetz et al., 2014), often when interacting with others in their workplaces and schools (Chan et al., 2018; Chin et al., 2017). By achieving an enhanced understanding of the interpersonal consequences of boredom, we demonstrate how these interactions can be improved.

Second, past studies investigating the role of state boredom on interpersonal behavior have failed to provide participants with a non-social behavioral alternative when eliciting prosocial or antisocial behavior (Pfattheicher et al., 2021; Van Tilburg & Igou, 2017). This non-social alternative is especially relevant, as past research has shown that boredom prompts people to engage in any behavioral alternative available in a boring situation—even self-harmful ones (Chapman & Dixon-Gordon, 2007). By including a non-social alternative in our social behavior elicitations, our experimental design allowed us to determine whether boredom makes a specific impact on social behavior or if, to the contrary, past research has mistakenly interpreted a general increase in the tendency to engage in any activity as a change in social preferences.

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Third, in addition to offering a non-social alternative, our study is the first one to make the behaviors costly for the participant. Incorporating costs into this experiment adds value, as it will likely reduce careless responding and noise—that is, random responding due to apathy (Harrison, 1994; Voslinsky & Azar, 2021). This is especially relevant given that past work has shown that boredom is linked to decision errors and noise, factors that can be misattributed as boredom-induced preferences (Wolff et al., 2022; Yakobi & Danckert, 2021).

Fourth, the current study may uncover the potential influence of boredom in standard experimental paradigms assessing prosocial and antisocial behaviors. Indeed, numerous studies on these behaviors have employed economic games with extensive descriptions of the paradigms provided to participants, possibly leading to varying levels of boredom. Similarly, certain paradigms involve 50 repetitive rounds of the same economic game (e.g., Dong et al., 2016; Gächter et al., 2008; Meier et al., 2023), which could generate a significant degree of boredom. Consequently, it is conceivable that boredom contributes to, and may even be responsible for, a portion of the prosocial and antisocial behaviors observed in these paradigms. The present research aimed to provide preliminary insights into this matter.

Finally, this paper makes a significant contribution to the existing literature by adding personality measurements and examining their potential moderating effect on the relationship between boredom and prosocial or antisocial behavior. By uncovering the social nature of boredom, this research may alter the prevailing view on this emotion, offering valuable insights to scholars, employers, teachers, and policymakers about how boredom could be handled differently to promote prosocial behavior and decrease antisocial behavior.

1. Boredom

When an individual expresses boredom, people often suggest alternative activities as a way of alleviating this emotion. This frequent response indicates that most people perceive boredom as a state to be escaped, possibly due to an unfulfilling current activity. In line with this intuition and our understanding of boredom, Eastwood et al. (2012) defined boredom as an "aversive experience of wanting, yet being unable, to engage in a satisfying activity" (p. 482). Research substantiates the aversive experience of boredom by demonstrating a correlation between individuals who report feeling bored and an increased frequency of negative emotions (Chin et al., 2017), a perception that time is passing slowly (Danckert & Allman, 2005), and a difficulty concentrating (Eastwood et al., 2012). People who are prone to experiencing boredom are also more likely to engage in compulsive gambling and report higher levels of depression and anxiety (LePera, 2011; Mercer & Eastwood, 2010).

To experience boredom, certain conditions must be fulfilled. According to the meaning and attentional components (MAC) model of boredom (Westgate & Wilson, 2018), the experience of this emotion is rooted in two main (independent) components: an attention and a meaning component. In short, boredom can arise out of a lack of attention, a lack of meaning, or a lack of both (Elpidorou, 2021; Westgate & Wilson, 2018). In the present work, we conceptualized attention in terms of cognitive engagement; therefore, lack of attention can be understood as the absence of cognitive engagement with the current task or situation (Westgate & Wilson, 2018). The missing cognitive engagement is most likely caused by a mismatch of the cognitive demands of the situation and the cognitive resources of the person at that given moment (Hunter & Eastwood, 2018). If the cognitive resources of the person and the demands of the situation match, the person can cognitively engage (i.e., pay attention). If there is a mismatch between the cognitive resources of the person and the cognitive demands of the situation, cognitive engagement becomes difficult (i.e., they are lacking attention). In addition, the difficulties of engaging can be caused by overstimulation or understimulation. In the case of overstimulation, the mismatch is due to higher cognitive demands in the situation than the resources the person has at that given moment. In the case of understimulation, the mismatch is due to lower cognitive demands of the situation than the resources the person has at that given moment. In this case, a person might look for a more stimulating activity to reestablish cognitive engagement.

The meaning component of boredom addresses the question of whether an individual wants to engage in an activity (Westgate & Wilson, 2018). Meaning is lacking if the current activity does not align with the values and goals of a person and is therefore perceived as purposeless (Chan et al., 2018; Westgate & Wilson, 2018). Boredom arises in these situations, signaling to the individual a need to restore their sense of meaning by disengaging from the current activity and searching for a new one (Van Tilburg & Igou, 2012). In support of this idea, Chan et al. (2018) reported that participants who had been asked to recall boring situations described them as purposeless as well.

In our research, we aimed to study mixed boredom caused by a mixture of lack of attention and lack of meaning. We believe this mixed boredom effectively accounts for many everyday scenarios in which boredom is prevalent (Chin et al., 2017). For instance, a typical lecture might be perceived as meaningful because the attendee wants to finish the studies to achieve a goal and, overall, the study program fits with the cognitive abilities. However, in that specific moment, while sitting in a classroom, the lecture content might seem to be lacking in meaning (for example, a student may question if the topic of discussion will ever be relevant in life), and the lecture presentation might be a mismatch with the attendee's cognitive demands at that given moment (for example, the lecturer's delivery may be slow). Thus, the situation is lacking attention and meaning, and, therefore, boredom results from both sources, which results in mixed boredom.

Regardless of the cause of boredom, bored individuals are motivated to engage in activities that provide something they are not getting in their current situation (Van Tilburg & Igou, 2012; Westgate & Steidle, 2020; Westgate & Wilson, 2018).[1] Our primary hypothesis revolved around the idea that boredom acts as a catalyst for behavior, even if such behavior incurs a cost to the participant. Our prediction is rooted in functional theories on boredom, understanding boredom as signaling a desire to change (Bench & Lench, 2013).

H1. We predict boredom will elicit behavior.

The chosen behavior should be different from the current boring ones (Bench & Lench, 2019). In cases of everyday boredom, caused by a mixture of a lack of cognitive engagement and a lack of meaning, the chosen behavior should be rewarding and satisfying (to address a lack of meaning) or arousing and stimulating (to address a lack of cognitive engagement). To achieve these goals, people may turn to prosocial or antisocial behavior.

1.1. Interpersonal behavior

1.1.1. Prosocial behavior

Defined by Batson et al. (2008), prosocial behavior "covers the broad range of actions intended to benefit one or more people other than oneself—actions such as helping, comforting, sharing and cooperating" (p. 463). We reasoned that prosocial behavior works as an antidote to boredom. The experience of boredom prompts a meaning-regulation process, leading to a search for activities that help the individual reestablish a sense of purpose (Heine et al., 2006; Van Tilburg & Igou, 2011). Examples of these meaning-enhancing activities include recalling

[1] A reviewer pointed us to the work by Trudel et al. (2025), which argues for boredom as a broader drive to maintain cognitive homeostasis. This aligns with our argument that, in a state of deficits, boredom motivates individuals to seek a state of homeostasis in order to remedy the underlying deficits that brought it about (Bench & Lench, 2019; Van Tilburg & Igou, 2012; Westgate & Wilson, 2018; Westgate and Steidle, 2020).

nostalgic memories (Van Tilburg et al., 2013), becoming more politically extreme (Van Tilburg & Igou, 2016), or favoring an ingroup (Van Tilburg & Igou, 2011). Importantly, it has been shown that prosocial behavior can (re)establish meaning (Klein, 2017; Van Tongeren et al., 2016) and might therefore act as an antidote to boredom. In fact, Van Tilburg and Igou (2017) tested the relationship between boredom and prosociality and found that bored participants reported higher prosocial intentions. Yet in these experiments, rather than actual behavior, only prosocial intentions (i.e., willingness to donate to a hypothetical charity organization) were investigated. The relationship between boredom and prosocial behavior was also addressed in an experiment run by Pfattheicher et al. (2021). In this study, the participants could increase (or decrease) another person's payment while watching a boring video. In contrast to the findings reported by Van Tilburg and Igou, bored participants were significantly less likely to increase the other person's payment. This raises the question of whether boredom might rather be a motivator for antisocial behavior.

1.1.2. Antisocial behavior

Antisocial behavior can be defined as actions intended to reduce the well-being of other people—actions such as hurting, provoking, stealing, or damaging other people's property (Patterson et al., 1989). We reasoned that antisocial behavior can help people escape boredom by offering stimulation, as antisocial behavior is often perceived as arousing and pleasant (Baumeister & Campbell, 1999; Chester, 2017). Hence, bored individuals might seek antisocial behaviors as a way of increasing their levels of stimulation. In line with this idea, past evidence has shown that bored individuals are more likely to bully at school (Pfattheicher et al., 2023) and shred worms (Pfattheicher et al., 2021), and they are more likely to decrease another participant's pay (Pfattheicher et al., 2021). This increase in antisocial tendencies occurs in the absence of a non-social alternative behavior. If there is an alternative behavior, however, boredom only increases antisocial behavior (i.e., decreasing another person's payment) among individuals with high dispositional sadism (Pfattheicher et al., 2021).

In our experiment, we tested both claims. We predicted participants would change their behavior, as boredom signals them to do so, and try to reestablish their lack of meaning and/or attention. In this regard, we assumed that participants would choose actions that provide them with a sense of meaning and/or stimulation, which we argued is possible by choosing social behaviors. This led to our second set of hypotheses:

H2a. We predict boredom will elicit prosocial behavior.

H2b. We predict boredom will elicit antisocial behavior.

Additionally, we examined whether the relationship between boredom and prosocial or antisocial behavior is moderated by different personality traits.

1.1.3. Personality traits as moderator

We further examined the role of personality traits in the relationship between boredom and prosocial or antisocial behavior. Specifically, we explored if a general disposition for prosocial behavior, Honesty-Humility, and a general disposition for antisocial behavior, the D-factor of personality (D), have a moderating effect on the relationship between boredom and prosocial or antisocial behavior. By doing so, we sought to answer the question of who is more likely to engage in prosocial or antisocial behavior when bored.

Honesty-Humility. Honesty-Humility is the basic prosocial personality trait, reflecting the general tendency "to be fair and genuine in dealing with others, in the sense of cooperating with others even when one might exploit them without suffering retaliation" (Ashton & Lee, 2009, p. 156). This construct has been related to prosocial behaviors such as refraining from stockpiling during the COVID-19 pandemic (Columbus, 2021), giving in a dictator game (Baumert et al., 2014; Hilbig et al., 2015; Hilbig & Zettler, 2009), and exhibiting prosocial behavior in school and work contexts (Allgaier et al., 2015; Pletzer et al., 2019).

D. The D-factor is a recent advanced development in the study of antisocial personalities. According to Moshagen et al. (2018), the basic idea of D is that it captures a large share of the variance of more specific traits (e.g., sadism, narcissism) and reflects a general antisocial tendency "to maximize one's individual utility" across a range of behaviors and situations (Zettler et al., 2021). In this regard, the D-factor of personality has been related to dishonest behavior in cheating tasks to avoid a boring task (Moshagen et al., 2020), and studies have aligned it with selfish behavior in a dictator game (Moshagen et al., 2018). Longitudinal studies supported the idea of a conceptual overlap between D, dark traits (Moshagen et al., 2018), and socially aversive psychopathologies like antisocial, narcissistic, and paranoid tendencies (Hilbig et al., 2021).

Following up on our second hypothesis, we argued that the social behavior that participants choose to engage in as a form of "escaping" boredom will align with their personality. This reasoning is in line with the situational affordances' framework (Gibson, 1977; Thielmann et al., 2020). Specifically, the framework holds that "situations have properties that provide a context for the expression of motives, goals, values, and preferences" (Reis, 2008, p. 316). From the perspective of the situational affordances' framework, people high in Honesty-Humility express their prosocial preferences in situations that "afford" (or provide the opportunity for) prosocial behavior (Thielmann et al., 2020). Building on the MAC model and the notion that boredom is a signal to change and motivates people to engage in behavior, we predicted that boredom motivates people high in Honesty-Humility to engage in prosocial behavior. By contrast, for individuals low in Honesty-Humility, prosocial behavior does not reflect a situational affordance; in this sense, one should not expect that boredom motivates individuals low in Honesty-Humility to engage in prosocial behavior. Overall, based on the assumption that boredom is a motivator of behavior, it should motivate prosocial individuals (participants scoring high on Honesty-Humility) to engage in prosocial behavior (which aligns with the affordance framework).

H3a. Boredom increases prosocial behavior in individuals scoring high on Honesty-Humility more so than in individuals scoring low on Honesty-Humility.

Conversely, from the perspective of the affordance framework, people high in D express their antisocial preferences in situations that "afford" (or provide the opportunity for) antisocial behavior (Thielmann et al., 2020). Again, building on the MAC model and the notion that boredom is a signal to change and motivates people to engage in behavior, we predict that boredom motivates people high in D to engage in antisocial behavior. By contrast, for individuals low in D, antisocial behavior does not reflect a situational affordance; in this sense, one should not expect that boredom motivates individuals low in D to engage in antisocial behavior. Overall, based on the assumption that boredom is a motivator of behavior, it should motivate antisocial individuals (participants scoring high on D) to engage in antisocial behavior (which aligns with the affordance framework).

H3b. Boredom increases antisocial behavior in individuals scoring high on D more so than in individuals low on D.

1.2. The present research

The present research tested whether boredom increases behavior and whether boredom increases specifically prosocial and antisocial behaviors. Furthermore, we examined the potential moderating effect of personality on the relationship between boredom and prosocial or antisocial behavior. To test the hypotheses, our main experimental task consisted of playing a modified dictator game (as a dictator) while watching a video. The experiment had three different experimental arms. Each arm had one experimental group (high boredom) and one

control group (low boredom), resulting in a 2 × 3 between-subjects design. Across all conditions, the participants received an endowment to be used in a modified standard economic game, that is, the dictator game. Specifically, all participants were assigned to the role of the dictator. The behavioral options available to the participants in the modified dictator game differed across the three arms (combinations of prosocial, antisocial, and non-social alternatives). Beyond the behavioral alternatives, the participants always had the option to not engage in any behavior at all.

Aside from testing our main hypotheses, we explored the roles of meaning, stimulation, and agency as exploratory mediators of the relation between boredom and interpersonal behavior. We focused on these three psychological constructs, as missing meaning and stimulation are the main components behind boredom in the MAC model (Westgate & Wilson, 2018). Agency was also incorporated because different theoretical accounts of boredom point to a lack of agency as one main cause of boredom (Gorelik & Eastwood, 2024). Finally, we conducted exploratory tests to determine if boredom proneness—the participants' tendencies to experience boredom frequently and intensely (Farmer & Sundberg, 1986)—moderates the relationship between boredom and interpersonal behavior. This specific study structure can address the limitations of previous work: it is the first study to provide a non-social alternative to antisocial or prosocial behavior when examining the role of boredom. The non-social task was designed to mirror everyday behaviors in which individuals engage without explicit prosocial or antisocial intent, such as doodling on a piece of paper. This design feature allowed us to examine whether participants are motivated to engage in any activity or, to the contrary, if they are motivated to pursue a specific prosocial or antisocial goal. In addition to offering a non-social alternative, our study is the first to make the different behavioral alternatives costly for the participant. That is, a participant's final payment depended on their choice of increasing or decreasing money from another individual in the dictator game. Finally, this work examined if predispositions (e.g., Honesty-Humility, D) moderate the relationship between boredom and prosocial or antisocial behavior, which further advances an understanding of the decision-making consequences of this emotion.

2. Methods

The Stage 1 registered report, data and materials can be found here https://osf.io/cav4d/. This study was approved by the IRB of the first author's institution. Participants granted consent before starting the study, and there was no deception involved.

2.1. Participants

We recruited participants using Prolific Academic. We used a sample from the UK, ensuring that our participants are fluent in English and that they had an acceptable record of careful responses in similar tasks (>95 % approval rate in Prolific tasks). Participants received compensation in three parts. First, they received a base payment of 1.30 Great Britain Pounds for their participation. Additionally, participants received 50 pence to engage in the role of the "dictator." They were allowed to keep that extra amount by not choosing costly behavior (i.e., no clicking on the images), for which they received the additional 50 pence themselves. If they decided to engage, 10 pence were subtracted for each click. This was the money that was determined by the participant's own behavior.

A second payout, starting with a baseline of 50 pence, was determined by the decisions of a paired participant in the role of the dictator. Specifically, participants were paid an amount between 0 and 1 Great Britian Pounds at the end of the experiment as determined by the decision of another randomly paired participant in the role of the dictator. To avoid any strategic behaviors, the existence of this second bonus payment was disclosed only at the end of the experiment. The goal of this second bonus payment was to implement the decisions of the participants in the first modified dictator game. In doing so, we avoided deception without inducing strategic concerns.

2.2. Design

We examined the relation between boredom and prosocial or antisocial behavior in a large between-subjects experiment. In this study, the participants were randomly assigned to a boredom condition (high vs. low boredom) and an experimental arm (arm 1 vs. arm 2. vs. arm 3), resulting in a 2 × 3 between-subjects design.

In general, we followed the procedure presented in Study 7 of Pfattheicher et al. (2021). At the beginning of the study, the participants worked on items assessing Honesty-Humility, D, and Boredom Proneness. Honesty-Humility was assessed using the HEXACO-60 (Ashton & Lee, 2009). Specifically, we used the 10 items connected to Honesty-Humility (e.g., "I would never accept a bribe, even if it were very large."). D was assessed using the D16, a previously validated 16-item scale (e.g., "I would like to make some people suffer, even if it meant that I would go to hell with them"; Moshagen et al., 2020). Boredom proneness was assessed using the eight-item short boredom proneness scale (e.g. "I often find myself at 'loose ends,' not knowing what to do"; Struk et al., 2017). Responses to the three scales were assessed on a 5-point Likert scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). Next, we asked the participants if they were still interested in taking part in the study even if it might be a potentially uninteresting video. Only those confirming that "I promise to pay attention to the video material" were included in our analyses. This procedure helped avoid unequal dropout in the high- versus low-boredom condition.

2.2.1. Boredom induction

The participants were randomly assigned to a high- and a low-boredom condition. Specifically, those assigned to the high-boredom condition watched a 5-min video showing a stone and nothing else happening. Those in the low-boredom condition watched a 5-min video featuring two magicians, each performing a magic trick. Previous research showed that this manipulation increased a state of boredom (Cohen's $d = 1.03$) in online samples (Pfattheicher et al., 2021). To control whether the conditions differed in state boredom in our experiment, we assessed boredom experience after the videos using the following item as a manipulation check and a measure of state boredom: "During the video, I was bored." To control whether the conditions differed in other domains, participants rated the statements, "Right now, I am happy" and, "Right now, I am frustrated" on a Likert scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). By asking for happiness, we believed it was possible to secure a general sense of the domains negative and positive. The emotion "frustration" was slightly increased by the manipulation in Pfattheicher et al.'s (2021) study.

2.2.2. Modified dictator game

Two minutes into the video (and while watching it), the participants faced the choice of engaging in different (and previously explained) tasks. Specifically, we used the dictator game in modified versions. In our version, participants acted as the dictator by clicking different images in a picture (see Fig. 1). There were three different versions to which participants were randomly assigned. In all versions, participants had the opportunity to spend an extra payment of 50 pence.

In the first version (prosocial arm, arm 1), they could decide to spend the extra 50 pence to engage in behavior by clicking images in two pictures (each click, in all tasks, costed 10 pence). They could "escape" boredom by acting and choosing between two different outcomes for their actions in the picture tasks: a prosocial outcome was obtained by clicking symbols of money to increase the payment of another participant (see Fig. 1, right panel), and an outcome without social consequences was obtained by clicking symbols of animals (see Fig. 1, middle panel). Participants also had the option of not acting at all (and keep the 50 pence).

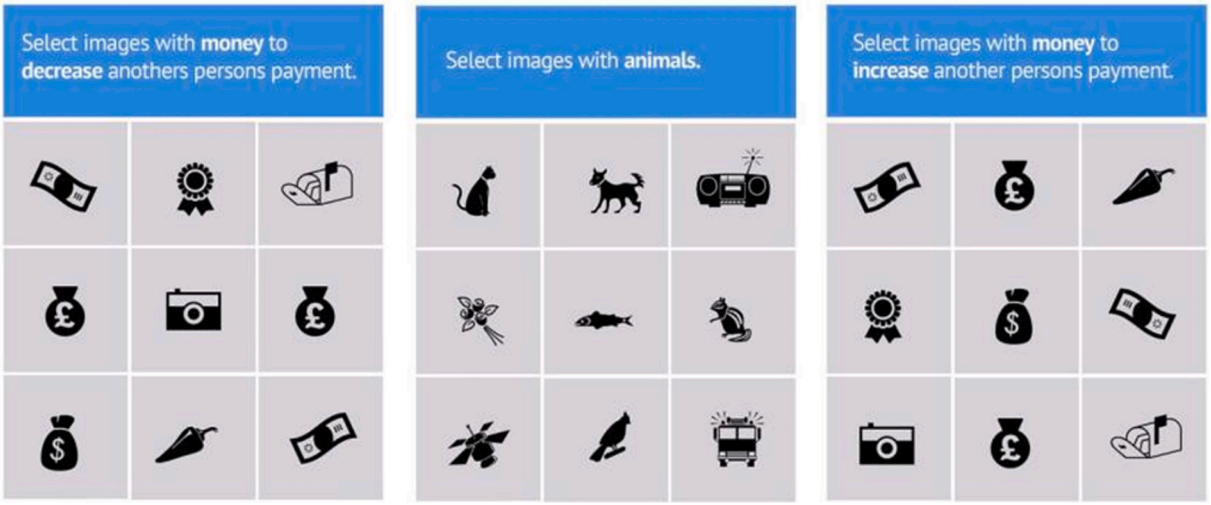

Fig. 1. Behavioral Options in the Pro- and Antisocial Arm, Arm 2.
Note. After two minutes, the three behavioral options appeared, and participants could engage with up to five clicks on the different symbols. In the prosocial arm (arm 1), the antisocial alternative (left picture) was not shown. In the antisocial arm (arm 3), the prosocial alternative (right picture) was not shown. The non-social alternative (middle picture) was always available.

In another version (antisocial arm, arm 3), participants could "escape" boredom by acting and choosing between two different outcomes: by clicking symbols of money, they achieved an antisocial outcome and decreased the payment of another participant (see Fig. 1, left panel), and by clicking on animals, they achieved a non-social option. They also had the option to not act at all (and keep the 50 pence).

In the last version (pro- and antisocial arm, arm 2), we tested all behavioral options against each other, meaning participants could "escape" boredom by choosing the prosocial outcome, the antisocial outcome, or the non-social option. They also had the option to not act at all (and keep the 50 pence). Fig. 1 represents the setting faced by participants in the pro- and antisocial arm, arm 2. Participants learned that they cannot unclick a picture.

2.2.3. Additional measures

At the end of the experiment, we asked the participants to complete short measures of meaning, stimulation, and agency aimed at capturing these participants' states during the video task. Specifically, we measured meaning with the following prompts: "During the video, I wanted to turn to a more meaningful activity" and, "During the video, I felt like doing something purposeful." Stimulation was assessed with these distinct prompts: "During the video, I wanted to turn to a more exciting activity" and, "During the video, I wanted to turn to a more engaging activity" (both measures were adapted from Pfattheicher et al., 2021), and agency was evaluated with the prompt, "During the video, I felt the need to be in control of what happens next." In line with the recommendations of Charles et al. (2023), we assessed age, gender, education, and ethnic origin.

2.2.4. Attention checks

To ensure that the participants were fully engaged in our experiment, we followed two procedures. First, we added an attention check to ensure that the participants are watching their assigned video. Specifically, 15 s after the video started, the participants had 5 s to confirm that they are paying attention by clicking a box. Participants who failed this attention check were discontinued from the study, and no further data were collected from them. Only after this preliminary attention check did the randomization of participants take place. Second, at the end of the experiment, we asked participants, "Were you distracted in any way while watching the video (that is, looking at your phone, opening a new window in the browser, or watching TV)? This will not affect your payment or the approval of your task." For our main analyses, we excluded the participants who answered "yes" to this self-reported attention check.

2.3. Sample

Following our a priori sample plan, we collected data from 3953 individuals. Of these, 133 missed one or more attention check in the questionnaires,[2] and 248 individuals reported doing something else while watching the video. Moreover, due to a coding error, four participants were inadvertently allowed to click on more than five images. We excluded these observations, resulting in a final sample size of 3568 participants (M_{age} = 42.40, SD = 14.06, 53.6 % female). Demographic variables for the main sample are displayed in Table 1 (see Supplementary Material [SM] Table A for further demographic information on the sample.)

3. Results

3.1. Manipulation checks

To check whether our boredom manipulation successfully induced higher levels of boredom, we ran *t*-tests comparing the average boredom scores in our self-reported measure in the low- and high-boredom con-

Table 1
Descriptive demographics and personality traits of the sample.

Characteristic	*N*	*M*	*SD*
Age	3567	42.40	14.06
Honestly-Humility	3568	3.51	0.65
D	3568	1.85	0.50

Note. One participant did not indicate their age.

[2] Although our preregistered and used survey setup included three attention checks in the personality questionnaires, we did not specify this exclusion criterion explicitly in our Stage 1 version of this registered report. However, we determined that excluding all participants who failed the attention checks was a more rigorous approach. As registered, we also conducted the same analyses including all participants conducting the experiment until the end, which are reported in the supplementary material for transparency.

ditions. These *t*-tests were conducted separately for each experimental arm. In all cases, participants assigned to the high-boredom condition reported significantly higher levels of boredom compared to those in the low-boredom condition. The differences in boredom between the two conditions were very large, with all Cohen's *d* values exceeding 1.5. We also tested the impact of our boredom manipulation on frustration and happiness for each experimental arm (see Table 2). The results were significant in all cases, showing an increase in frustration and decrease of happiness for our manipulation, yet with much smaller effect sizes (Cohen's *d* values falling below = 0.55).

3.2. Main analyses

3.2.1. Impact of boredom on behavior (H1−H2)

In our main analyses, we defined three outcome variables. These variables measured the extent (from 0 to 5 clicks) of each participant's engagement in prosocial, antisocial, or any behavior at all (i.e., the sum of prosocial, antisocial, and non-social clicks made in the main task by each participant). Overall, most clicking was shown in the pro-and antisocial arm offering all behavioral options next to each other, followed by the prosocial arm missing the antisocial alternative. The least clicks were shown in the antisocial arm missing the prosocial alternative. We found an overall pattern in the clicking behavior: although not statistically significant, clicking was numerically highest on the prosocial option when the prosocial option was available, preferred over both the antisocial and non-social alternatives. When no prosocial option was available, participants clicked numerically more on the non-social alternative than on the antisocial one (see Fig. 2). As expected, in two of the three experimental arms, more clicking was shown in the high-boredom condition. In the prosocial arm, people clicked more in the low-boredom condition.

Using *t*-tests, we compared the average values of these three variables between the high- and low-boredom condition in each of our three experimental arms (see Table 3). Surprisingly, we did not find a significant impact of our boredom manipulation on general behavior (H1), prosocial behavior (H2a), or antisocial behavior (H2b).

3.2.2. Moderation analyses (H3)

Next, we explored whether our results are shaped by individuals' prosocial and antisocial traits (Honesty-Humility and D). To do this, we estimated four different models (Fig. 3). First, in two separate regression models for the prosocial and the pro- and antisocial arm, we used ordinary least squares (OLS) to regress our measure of prosocial behavior on the boredom treatment variable (i.e., a binary variable taking a value of 1 if the participant was assigned to the high-boredom condition and 0 otherwise), the participants' Honesty-Humility scores, and the interaction of these two variables. In another set of two independent regression models for the antisocial arm and the pro-and antisocial arm, we used OLS to regress our measure of antisocial behavior on the boredom treatment variable, the participants' D-factor score, and the interaction of these two variables. All reported coefficients were standardized.

Neither our boredom treatment variable nor its interaction with Honesty-Humility were significant predictors of prosocial behavior in any of the arms with a prosocial option (see Table 4, Models 1 and 2). Honesty-Humility was significantly and positively associated with prosocial clicks only when an antisocial option was also presented, Model 2, $\beta = 0.072$, $SE = 0.027$, $t(1367) = 2.67$, $p = .008$. This supports the idea that the prosocial trait of Honesty-Humility is influential when individuals can choose between prosocial and antisocial options. By contrast, when only a prosocial option is available, even those low in Honesty-Humility may choose to act—and do so prosocially (rather than antisocially or non-socially)— thus diluting the relationship between Honesty-Humility and prosocial behavior.

Turning to antisocial behavior, we found an overall effect of the antisocial personality trait D on antisocial clicks in our paradigm, regardless of whether an additional prosocial option was presented (see Table 4, Models 3 and 4). This speaks to the validity of the used paradigm and mirrors previous research showing that D relates to antisocial behavior in incentivized paradigms (Moshagen et al., 2018; Moshagen et al., 2020). For the interaction of D and boredom, we found no significant moderation effect of the participants' antisocial tendencies. However, the interaction between D and our boredom manipulation became significant when analyzing the full sample[3] for our robustness check ($N = 1292$, see SM, Table B1), $\beta = 0.056$, $SE = 0.027$, $t(1288) = 2.065$, $p = .039$. For instance, in our main sample, for those with an average D score, our boredom manipulation had a negligible impact on their number of antisocial clicks (those assigned to the high-boredom condition had, on average, 0.033 more antisocial clicks). On the other hand, for those with a D score 2 *SD*s above average, the impact of our boredom manipulation was non-negligible (an increase in the number of clicks of 0.28 in the high-boredom condition). That is, boredom seems to increase antisocial behavior for those with relatively high levels of D.

When all behavioral options were presented (prosocial, antisocial, and non-social; arm 2), the effect appeared to fade. In this arm, our boredom variable once again did not emerge as a significant predictor of antisocial behavior. This suggests that the inclusion of a prosocial option may have reduced the influence of boredom and antisocial tendencies on antisocial behavior. Overall, the findings point to a complex picture regarding the interplay of D and being bored: when there is only an antisocial option presented next to a non-social option, boredom promoted antisocial behavior in people with high levels of D. When we added a prosocial option to the picture, this interaction seems to weaken; that is, when faced with only an antisocial option, people scoring high on D use the situation to click on the antisocial option, especially if bored. Adding the prosocial option changes the situational framework, and people scoring high on D use the situation to click on the antisocial option, regardless of their level of boredom.

3.3. Exploratory analyses[4]

3.3.1. Comparing the effect of boredom on prosocial against antisocial behavior

In the main analyses (H1–H2), we found that the effect of boredom on both prosocial and antisocial behavior was not significantly different from 0. However, it could be that the one of these effects is slightly positive and the other slightly negative and thus, although not being different from 0, being different from each other. In our initial exploratory investigation, we analyzed whether the impact of our boredom manipulation differed on prosocial versus antisocial behavior. To do so, we first focused on participants facing both the prosocial and antisocial alternative (arm 2). For these participants, we created a variable to measure the extent (i.e., number of clicks) of their engagement in either prosocial or antisocial behavior. This variable had two observations per participant—one observation reflecting prosocial and another one reflecting antisocial behavior. Using OLS, we then regressed this outcome variable on a binary treatment variable (1 for the high-boredom condition, 0 for the low-boredom condition), a task variable (1 for antisocial clicks, 0 for prosocial clicks), and the interaction of these two variables. We followed a case bootstrap procedure to estimate standard errors as the observations are not independent.

These results suggest that the impact of our boredom manipulation may differ between prosocial and antisocial behavior, $\beta = -0.031$, SE = 0.014, 95 % CI [−0.059, −0.004], $p = .012$. Boredom was associated with a slight increase in prosocial behavior and a slight decrease in antisocial behavior—neither effect was statistically significant on its

[3] $N = 3953$; all participants that finished the experiment.

[4] The results of one additional exploratory analysis—specifically, if the effect of the boredom manipulation is moderated by the participants' boredom proneness—are reported in the SM Table B1.

Table 2
Results of t-tests comparing the average emotion scores in the different arms.

Emotion	Boredom Condition				*df*	*t*	*p*	Cohen's *d*
	High		Low					
	M	*SD*	*M*	*SD*				
Boredom								
Prosocial	4.01	0.98	1.97	1.11	1028	31.42	< 0.001	1.95
Pro- and anti	3.87	1.04	2.07	1.20	1368	29.77	< 0.001	1.60
Antisocial	3.92	1.10	2.03	1.17	1163	28.49	< 0.001	1.67
Frustration								
Prosocial	2.17	1.13	1.61	0.91	940	8.76	< 0.001	0.55
Pro- and anti	2.08	1.05	1.60	0.89	1314	9.09	< 0.001	0.50
Antisocial	2.13	1.14	1.64	0.94	1082	8.04	< 0.001	0.48
Happiness								
Prosocial	3.47	0.91	3.91	0.85	1003	−8.02	< 0.001	−0.50
Pro- and anti	3.57	0.89	3.89	0.80	1301	−7.04	< 0.001	−0.38
Antisocial	3.49	0.93	3.85	0.84	1122	−7.06	< 0.001	−0.42

Note. Prosocial, Pro- and antisocial, and Antisocial describe the three differing arms with their differing behavioral options.

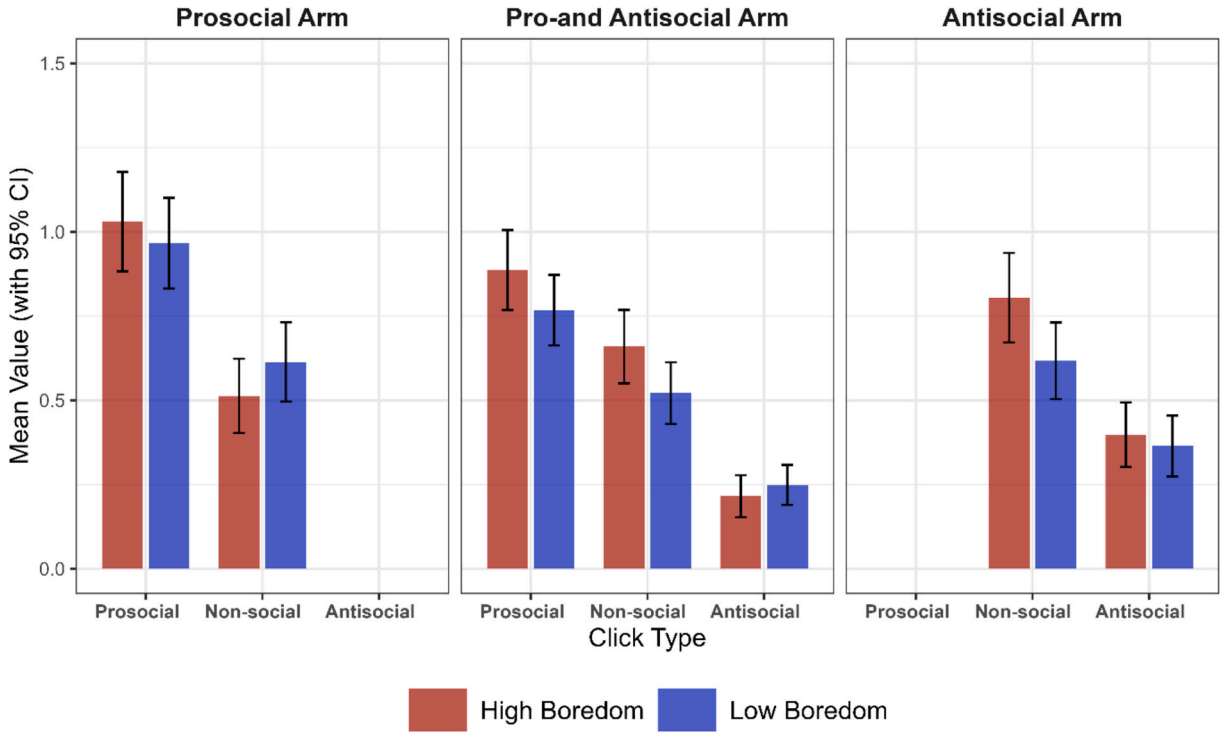

Fig. 2. Descriptive Overview of clicking behavior in the differing experimental arms.
Note. $N = 1031$ in the prosocial arm; $N = 1371$ in the pro-and antisocial arm; $N = 1166$ in the antisocial arm.

Table 3
Results of t-Tests Comparing the Average Clicks in the High- and Low-Boredom Condition.

Clicks	Boredom Condition				*df*	*t*	*p*	Cohen's *d*
	High		Low					
	M	*SD*	*M*	*SD*				
Total Clicks								
Prosocial	1.53	2.11	1.58	2.07	1017	−0.35	= 0.723	−0.02
Pro- and anti	1.74	2.18	1.54	2.14	1343	1.75	= 0.080	0.09
Antisocial	1.19	1.98	0.98	1.86	1138	1.88	= 0.060	0.11
Prosocial Clicks								
Prosocial	1.02	1.66	0.97	1.60	1012	0.55	= 0.584	0.03
Pro- and anti	0.88	1.53	0.77	1.44	1370	1.38	= 0.168	0.08
Antisocial Clicks								
Antisocial	0.39	114	0.36	1.14	1155	0.38	= 0.708	0.02
Pro- and anti	0.21	0.80	0.25	0.82	1357	−0.97	= 0.331	−0.05

Note. Prosocial, Pro- and antisocial, and Antisocial describe the differing arms with their differing behavioral options.

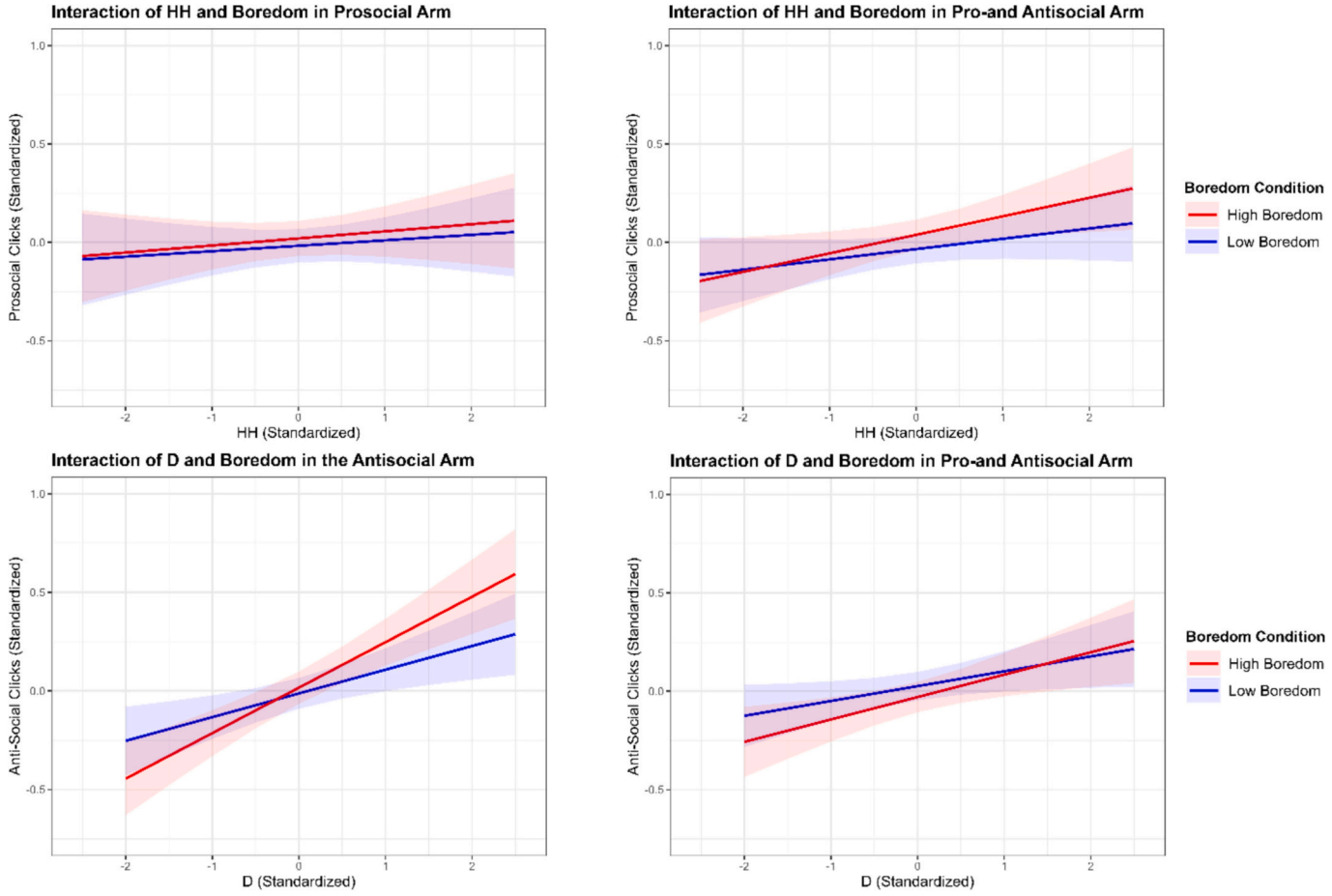

Fig. 3. Interaction Effects of the Personality Traits in the Differing Experimental Arms.

Table 4
Moderation Analysis: Honesty-Humility and D.

Variable	Clicks			
	Prosocial		Antisocial	
	Model 1 Prosocial arm	Model 2 Pro-and anti	Model 3 Antisocial arm	Model 4 Pro-and anti
Boredom	0.019	0.036	0.015	−0.028
	(0.031)	(0.027)	(0.029)	(0.027)
HH	0.032	0.072**		
	(0.031)	(0.027)		
Boredom x HH	0.004	0.021		
	(0.031)	(0.027)		
D			0.173***	0.093***
			(0.029)	(0.027)
Boredom x D			0.055	0.019
			(0.029)	(0.027)
Constant	0.0002	−0.0003	0.001	−0.0003
	(0.031)	(0.027)	(0.029)	(0.027)
Observations	1031	1371	1166	1371
R^2	0.001	0.007	0.032	0.010
Adjusted R^2	−0.002	0.005	0.030	0.007
Residual Std.	1.001	0.998	0.985	0.996
Error	(df = 1027)	(df = 1367)	(df = 1162)	(df = 1367)
F Statistic	0.450	3.171*	12.900***	4.406**
	(df = 3; 1027)	(df = 3; 1367)	(df = 3; 1162)	(df = 3; 1367)

Note. HH = Honesty-Humility; if not indicated otherwise, values in parenthesis are the standard errors.
*$p < .05$; **$p < .01$; ***$p < .001$.

own, but a significant interaction suggests a meaningful difference between the two. We replicated this analysis with the participants assigned to the experimental arms that only included a prosocial or an antisocial—but not both—behavioral alternative. Again, we defined a variable for the extent of engagement in prosocial or antisocial clicks. For this model, the outcome variable had only one measurement per participant (as the participants could not engage in both, prosocial and antisocial clicks). Using OLS, we regressed this outcome variable on a binary treatment variable, an arm variable (1 for the antisocial arm, 0 for the prosocial arm), and the interaction of these two variables. Contrary to the previous results, the impact of boredom on prosocial and antisocial behavior did not differ (see Table 5). Overall, we did not find consistent evidence that the impact of boredom differed across prosocial and antisocial behavior; however, it seems that presenting different behavioral options may have an impact on this effect.

3.3.2. *Mediation with meaning, stimulation, and agency*

We investigated if a lack of meaning, stimulation, and agency mediated the relationship between boredom and interpersonal behavior. To do so, we ran four mediation models (Table 6). Lack of meaning, stimulation, and agency were significantly higher in the high-boredom condition than in the low-boredom condition with medium to large standardized coefficients in all mediation models.

In the first set of two independent mediation models, we explored whether a lack of meaning, stimulation, and agency served as mediators between the boredom manipulation and prosocial behavior. We conducted these analyses separately for participants presented with the prosocial and non-social option (arm 1) and presented with all behavioral options (prosocial, antisocial and non-social, arm 2). We performed similar analyses for our measures of antisocial behavior. Specifically, we

Table 5
Exploratory analysis: comparing the effect of boredom on prosocial against antisocial behavior.

Variable	Clicks	
	Model 1 (arm 2) Pro- and antisocial	Model 2 (arms 1 and 3) Prosocial or antisocial
Boredom	0.014	0.014
	(0.014)	(0.021)
Antisocial clicks	0.240***	−0.216***
	(0.012)	(0.021)
Boredom x antisocial clicks	−0.031*	−0.005
	(0.014)	(0.021)
Constant	0.000	0.00000
	(0.000)	(0.021)
Observations	2742	2197
R^2	0.059	0.047
Adjusted R^2	0.058	0.046
Residual Std. Error	0.971 (df = 2738)	0.977 (df = 2193)
F statistic	56.958*** (df = 3; 2738)	36.051*** (df = 3; 2193)

Note. If not indicated otherwise, values in parenthesis are the standard errors. Standard errors in Model 1 are obtained by a case-bootstrap procedure.
*$p < .05$; **$p < .01$; ***$p < .001$.

Table 6
Exploratory analysis: mediation with meaning, stimulation and agency comparing the high- and low-boredom condition.

Variable	β	*SE*	*df*	*t*	*p*
Lack of meaning					
Prosocial	0.457	0.028	1029	16.49	< 0.001
Pro- and anti	0.404	0.025	1368	16.36	< 0.001
Antisocial	0.437	0.026	1164	16.56	< 0.001
Lack of stimulation					
Prosocial	0.542	0.026	1029	20.46	< 0.001
Pro- and anti	0.479	0.024	1369	20.17	< 0.001
Antisocial	0.510	0.025	1164	20.02	< 0.001
Lack of agency					
Prosocial	0.323	0.030	1029	10.93	< 0.001
Pro- and anti	0.299	0.026	1369	11.61	< 0.001
Antisocial	0.304	0.028	1164	10.89	< 0.001

examined if a lack of meaning, stimulation, and agency mediated the relationship between our boredom manipulation and antisocial behavior. These analyses were conducted separately for participants presented with the antisocial and non-social option (arm 3) and presented with all behavioral options (prosocial, antisocial and non-social, arm 2). For a full overview of the mediation analyses, see Tables B2–B4 in the SM.

For prosocial behavior, we found a positive association between lack of meaning and the number of prosocial clicks when no antisocial option was presented, $\beta = 0.15$, $SE = 0.054$, $t(1026) = 2.835$, $p = .004$. Thus, individuals reporting a lack of meaning engaged more extensively in prosocial behavior. However, this relationship for meaning did not replicate when the prosocial *and* the antisocial option (arm 2) were presented, $\beta = 0.073$, $SE = 0.046$, $t(1366) = 1.607$, $p = .108$. Instead, when a prosocial and antisocial option was presented, we found a positive and significant relationship between lack of agency and prosocial behavior, $\beta = 0.077$, $SE = 0.031$, $t(1366) = 2.476$, $p = .013$, and a negative and significant relationship between lack of stimulation and prosocial behavior, $\beta = -0.107$, $SE = 0.047$, $t(1413) = -2.295$, $p = .022$, implying that individuals reporting higher levels of stimulation engaged more extensively in the prosocial behavior. For antisocial behavior, we found a positive relationship between lack of agency and antisocial behavior in both experimental arms, the pro- and antisocial arm, $\beta = 0.121$, $SE = 0.031$, $t(1366) = 3.894$, $p < .001$, and the antisocial arm, $\beta = 0.154$, $SE = 0.034$, $t(1161) = 4.540$, $p < .001$. That is, individuals lacking agency engaged more extensively in our measure of antisocial behavior, regardless of alternatives. Overall, these results suggest that a need to reestablish agency is linked to pro-and antisocial behavior when bored. A need to reestablish meaning is linked to prosocial behavior when only a prosocial alternative is presented, but being engaged and entertained (and thus no need to reestablish stimulation) is linked to prosocial behavior when an antisocial behavior is also presented. Overall, these findings support previous research that has cited a lack of meaning, stimulation, or agency as underlying boredom and resulting behavior as attempts to reestablish meaning, stimulation, or agency.

4. Discussion

In this well-powered, online experiment, we employed a parsimonious design to investigate whether boredom impacts behavior. Specifically, we examined if participants exposed to high-or low-boredom conditions—manipulated through different video stimuli—were more likely to engage in behavior in general, prosocial, or antisocial behavior when bored. Our boredom manipulation proved effective as shown by the large differences in boredom between experimental groups.[5] Our results did not support the hypotheses that boredom directly increases behavior, whether general, prosocial, or antisocial. Examining the interaction between personality traits and our boredom manipulation, we found no interaction effect of Honesty-Humility and boredom or the D-factor and boredom.

In a set of exploratory analyses, we first tested whether the effect of boredom was different on prosocial and antisocial behavior but failed to find consistent evidence. We found that boredom significantly reduced participants' sense of agency, meaning, and stimulation. These findings align with theoretical frameworks, such as the MAC model (Westgate & Wilson, 2018), which propose that boredom arises from a lack of meaning or stimulation and support ideas that a lack of agency—the perception of having control over one's actions—is a fundamental component of the boredom experience (Gorelik & Eastwood, 2024). We found evidence that a lack of agency, meaning, and stimulation function as mediators in behavioral outcomes. Specifically, a lack of agency was correlated with increased prosocial and antisocial behaviors when both behavioral options were presented. Surprisingly, lack of stimulation was negatively correlated to prosocial clicks in this arm. Thus, feeling engaged and entertained correlated to prosocial clicks and not the *lack of* stimulation. For the arms presenting only one of the social alternatives, we found that a lack of agency was associated with increased antisocial behavior when no prosocial alternative was available. When only a prosocial alternative was presented, but no antisocial alternative, we found a positive correlation between a lack of meaning and prosocial clicks. Thus, prosocial behavior was linked to a lack of agency or feeling stimulated when an antisocial option was also presented and linked to a lack of meaning when only a prosocial option was presented. Antisocial behavior was linked to a lack of agency, regardless of the presented behavioral alternatives. Our findings indicate complex relationships between boredom, the examined mediators, and social behavior. To follow is a discussion of these pathways, which require further research for better understanding and validation.

4.1. Discussion of the main hypotheses

For our main hypothesis stating that boredom increases behavior, we found no supportive evidence. The absence of a total effect of boredom

[5] Notably, participants' happiness ratings remained above the scale midpoint even in the high-boredom condition. Although this may seem counterintuitive, the co-occurrence of positive and negative emotions is well-documented (Trampe et al., 2015). This finding may also reflect aspects of our design: the boredom check referenced the video directly, while the happiness measure was more general. Participants may have distinguished between the immediate boredom induced by the video and their overall mood, possibly influenced by relief or satisfaction at completing the study.

on behavior is surprising, particularly considering the previous studies that found boredom to influence behavior (Havermans et al., 2015; Nederkoorn et al., 2016 Pfattheicher et al., 2021; Wilson et al., 2014; Yusoufzai et al., 2024). One possible explanation could be that compared to previous studies on boredom and behavior, our design was more conservative, as it was the first to introduce a real cost to engaging in behavior. Specifically, participants had the option to use an additional payment to escape boredom. Although we hoped to buffer the aversiveness of spending one's money by making that amount an additional bonus payment, with us choosing an amount equal to nearly half of their base pay, the financial trade-off may have served as a strong deterrent to action. In this sense, even though people may have been bored and interested in escaping boredom, the high bonus payment might have hindered them from acting.

In line with this reasoning, existing research suggests that boredom heightens reward sensitivity (Milyavskaya et al., 2019). Given that participants completing online surveys are often motivated by monetary rewards and are accustomed to low-stimulation tasks, their primary goal may have been to maximize earnings. With heightened reward sensitivity, participants may have been even more motivated to keep the bonus payment, valuing it over alleviating boredom. This could have further discouraged them from engaging in behavior. Moreover, the prosocial and antisocial actions in our study lacked immediate incentives. Participants did not see the outcomes of their behaviors—whether helping or harming—unlike in real-life scenarios, where prosocial actions might be driven by the reward of being seen as generous, and antisocial actions might provide gratification from witnessing another's discomfort (Bekkers & Wiepking, 2011; Buckels et al., 2014). The absence of these social or emotional reinforcements may have further reduced the motivation to engage in such behaviors, especially when coupled with financial costs.

Our study's clearly communicated time frame of approximately 5 min of video content (and therefore knowing that boredom will end soon) could have influenced participants' willingness to endure the boredom without acting. Although the short duration might have still been able to induce boredom, our findings suggest that longer boredom inductions may be necessary to elicit the (stronger) motivational effects seen in previous research. Studies that observed impulsive, self-harming, or sadistic behaviors often posed longer boredom inductions lasting 15–60 min, with an increase in behavior the longer they lasted (e.g., Moynihan et al., 2015; Nederkoorn et al., 2016; Pfattheicher et al., 2021). As our study had similarities with Studies 7 and 8 of Pfattheicher et al. (2021), we conducted our power analysis leaning on their reported Cohen's *d*s of 0.2. Yet these effect sizes appeared when no costs or longer boring episodes were used. Even though our study was well-powered to find the above reported effect sizes, it might have been underpowered to find the effects of boredom on behavior in such a conservative design.

We believe the above-mentioned points may also explain the missing evidence for our second set of hypotheses stating that social behavior (pro- and antisocial) will be chosen over non-social behavior. Specifically, we found no significant difference in the boredom conditions between the social and non-social clicking behaviors for prosocial or antisocial behavior; what we did find was a pattern reflecting that, when available, prosocial clicking was chosen more often than the antisocial or non-social option. When no prosocial alternative was available, non-social clicking was chosen more often than antisocial clicking. Following these trends, one could argue that it is important to offer behavioral alternatives, especially in situations that by default may be more likely to offer antisocial alternatives.

4.2. Discussion of personality traits as potential moderators

Looking at the interaction of boredom and personality traits, the interaction with boredom and D approached significance in the condition where only the antisocial alternative was presented and reached significance when analyzing the full sample for our robustness check. The interaction remained non-significant when both antisocial and prosocial options were available. Our findings align with those of Pfattheicher et al. (2021), who found that individuals high in trait sadism were more likely to engage in antisocial behavior. However, our results show an opposing pattern to theirs in the interaction with boredom. In Study 7 of Pfattheicher et al., an interaction between trait sadism and boredom was observed when a prosocial alternative to antisocial behavior was provided, but this interaction disappeared in Study 8 when the prosocial option was removed and only the antisocial option remained. By contrast, our findings show a reversed pattern. The interaction effect emerges when only the antisocial option is available but disappears when a prosocial alternative is introduced. We propose that this may be because the presence of a prosocial alternative—a morally acceptable choice aligned with social norms—makes the antisocial option appear more overtly "dark," making it more appealing to individuals scoring high on D to click, regardless of whether or not they are bored.

Furthermore, our sample's D scores were notably lower than those reported in other studies, which may have influenced our findings. For instance, Hartung et al. (2022) reported a mean D score of 2.49 (SD = 0.69) in a sample of 12,501 participants, and Zettler et al. (2021) found a mean of 2.35 (SD = 0.38) in a sample of 1261 participants. By contrast, our sample had a mean D score of 1.85 (SD = 0.50), approximately one standard deviation lower than those reported values. This suggests that our sample may not fully represent the broader population, as individuals with higher D scores may have been less inclined to participate in what they perceived as a potentially uninteresting study, thus excluding them from our dataset. This lower baseline of antisocial tendencies may have attenuated the interaction effects observed in our study, potentially limiting the generalizability of our findings to populations with higher levels of D.

For Honesty-Humility and boredom, we did not find significant interaction effects. This suggests that boredom neither promotes prosocial behavior in general nor among individuals with inherently prosocial traits. In other words, those high in Honesty-Humility were no more likely to act prosocial when bored. The conclusion that boredom does not lead to prosocial behavior aligns with the findings of Pfattheicher et al. (2021), who observed that participants did not exhibit increased prosocial behavior when bored compared to a control group, even when the behavior required no cost. However, this conclusion contradicts the findings of Van Tilburg and Igou (2017), who suggested that boredom may promote prosocial behavior, as evidenced by students reporting stronger intentions to donate money to charity after experiencing boredom.

4.3. Discussion of the mediators lack of meaning, stimulation, and agency

Across all experimental arms, we found that boredom led to a perceived lack of meaning, a need for stimulation, and a need for agency. The relationship between boredom and both a lack of meaning and stimulation has been examined in previous research (Westgate & Wilson, 2018). The connection between boredom and a lack of agency has primarily been examined in the context of trait boredom (Dadzie et al., 2024; Gorelik & Eastwood, 2024). Our study provides evidence that state boredom is likewise associated with a reduced sense of agency.

Linking the lack of agency when bored to behavior, we found an increase in both prosocial and antisocial behaviors when both options were presented. This indicates that when individuals feel a diminished sense of agency, they are more likely to engage in any form of action—whether positive or negative—as a means of reasserting their agency (Bandura, 2006; Dadzie et al., 2024). Furthermore, a lack of agency mediated antisocial behavior in scenarios when no prosocial alternative was available, suggesting that the desire to regain control can manifest in harmful actions when no alternative behaviors are provided. Yet we found no effect of agency when only the prosocial option was presented. Instead, when the prosocial option was presented

in isolation, we found that a lack of meaning was linked to prosocial behavior. This suggests that in situations where participants had limited choices, the absence of perceived meaning may have prompted them to engage in prosocial actions as a way to restore a sense of purpose and is in line with other work showing prosocial behavior reestablishes missing meaning (Klein, 2017; Van Tongeren et al., 2016). A link between stimulation and prosocial behavior became evident when both the prosocial and antisocial options were available. Interestingly, participants who felt stimulated and engaged (and thus were not in need of stimulation) were more likely to act prosocially compared to those who reported missing engaging activities. This finding contrasts with assumptions that boredom-driven behavior stems from a desire to seek stimulation (Bench & Lench, 2013; Eastwood et al., 2012), suggesting instead that a baseline level of engagement and thus positive affect might facilitate prosocial choices when multiple options are present (Aknin et al., 2018).

Although we found no main (total) effect of boredom on behavior, we did observe the mediated (indirect) effects described above. One possible explanation (beyond the generally lower statistical power of total effects compared to indirect effects; Kenny & Judd, 2014) is that participants in our experiment, when being bored, may have regained a sense of agency or meaning precisely by choosing not to act. For instance, deliberately refraining from behavior, such as keeping the money, may have served as a meaningful choice. In indirect effect terms, being bored promotes a sense of agency or meaning, and these in turn lead to less behavior by deliberately refraining from action. This is an indirect effect of negative sign, and in this way, opposing indirect effects may cancel each other out in aggregate, so that we overall found no main (total) effect of boredom on behavior.

Overall, the observed effects of agency, meaning, and stimulation offer valuable insights into the mechanisms underlying boredom-driven behavior. Pfattheicher et al. (2021) focused primarily on meaning and stimulation deficits, but our findings suggest that agency may play an equally important role (Dadzie et al., 2024; Gorelik & Eastwood, 2024). When bored, individuals may prioritize behaviors that restore a sense of agency, whether through prosocial or antisocial means.

Our findings raise important questions about the motivational role of boredom and its dependence on context. Previous research highlighted boredom as a driver of social or impulsive behavior, but our research suggests that context-specific factors, such as costs and differing opportunities, can significantly influence whether and how boredom drives behavior.

5. Additional limitations

Certain limitations should be addressed. First, the short duration of our boredom manipulation may have reduced its motivational impact. Future research could explore longer boredom inductions to examine whether there might be a threshold of how long boredom is bearable without action. Second, the monetary aspect of our study may have disproportionately influenced participants' behavior. Although the inclusion of costs provides greater (ecological) validity, it also highlights the need to thoroughly think about it and the sample taking part in the experiment. We believe by testing our assumptions in a sample used to online experiments and surveys, mostly motivated by monetary incentives, may limit the external validity of our findings (Bühren & Kundt, 2015).

We kept the target of the prosocial or antisocial behavior simple by making it a fellow Prolific worker. Although this was a choice to keep our design parsimonious, it might have limited our findings, as previous research found effects of the target on social behavior with, for example, increased prosocial behavior toward ingroup members (Weisel & Böhm, 2015). Future research could explore how different targets influence behavior when bored, for example, framing the recipient as an ingroup or outgroup member or if the behavior shifts when the target is framed as responsible for the boredom. Furthermore, our presentation of prosocial and antisocial behavior was straightforward and obvious. Examining prosocial and antisocial behavior driven by boredom in less obvious ways could help mitigate responses influenced by social desirability or normative expectations (Wang & Navarro-Martinez, 2023). One potential approach could involve using computer games in which helping or hindering others occurs as a byproduct of gameplay rather than as explicit choices (cf. Leiberg et al., 2011).

In line with this, embedding prosocial and antisocial behaviors within a narrative could add depth and realism. Introducing a storyline or situational context—where participants help or hinder others—could provide additional motivation and make behaviors feel more consequential. For example, participants might be informed that their decisions will be revealed to others or that their actions have visible outcomes, enhancing incentives for prosocial and antisocial behaviors. A narrative frame may be important as boredom increases reward sensitivity (Milyavskaya et al., 2019). Finally, our study measured the mediators (lack of agency, meaning, and stimulation) and the effects of the boredom manipulation only after the different conditions, without pre- and post-measurements. Although we observed significant differences between the high and low boredom groups, we believe this limitation does not undermine our primary findings. However, future research should consider including baseline measures to provide a more comprehensive understanding of the impact of the boredom manipulation.

6. Conclusion

Our study highlights the complexity of boredom as a motivational driver, raising important questions about its dependence on context. We found that boredom decreases meaning, stimulation, and agency, and our correlational findings suggest that the behavior chosen when bored is linked to a sense of agency or meaning. Prior research has shown that boredom can fuel antisocial behavior, but our results indicate that situational factors, such as costs and alternatives, significantly influence whether and how boredom translates into action. These findings could be helpful to hinder antisocial behavior and to support prosocial behavior in everyday situations that may induce boredom. Our findings underscore the need for future research to consider and systematically explore how variations in behavioral options and their associated costs shape boredom-driven behavior, considering the broader situational context.

Author note

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CRediT authorship contribution statement

Thekla Müller-Boysen: Writing – review & editing, Writing – original draft, Project administration, Methodology, Conceptualization. **Sergio Pirla:** Writing – review & editing, Formal analysis. **Stefan Pfattheicher:** Writing – review & editing, Supervision, Funding acquisition.

Declaration of competing interest

The authors declare no competing interests. The funders had no role in study design, data collection and analysis, decision to publish, or preparation of the manuscript.

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Appendix A. Supplementary data

Supplementary Material to this article can be found online at https://doi.org/10.1016/j.jesp.2025.104804.

Data availability

We commit to making all our materials and raw data publicly available at the Open Science Framework upon acceptance of the Stage 2 manuscript.

We commit to making our analysis code, in R format, publicly available on the Open Science Framework upon acceptance of the Stage 2 manuscript.

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