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Relation between Psychopathic Traits and Sex in an Altruism Task

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**RELATION BETWEEN PSYCHOPATHIC TRAITS AND SEX
IN AN ALTRUISM TASK**

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RESUMO

A psicopatia pode ser descrita como um conjunto de traços de personalidade, normalmente associados a condutas antissociais, mas que resultam numa heterogeneidade de comportamentos. Pode ser dividida em psicopatia primária – refletindo maioritariamente défices afetivos na relação com os outros – e secundária – relacionada com comportamentos impulsivos e antissociais. A psicopatia tem sido associada negativamente com medidas de altruísmo, mas essa relação não tem sido muito explorada em tarefas de decisão económica. Para além disso, homens e mulheres tendem a expressar traços de psicopatia de forma diferente, pelo que é importante explorar se os eventuais efeitos destes traços no altruísmo dependem do sexo dos participantes. O objetivo deste estudo foi analisar como o desempenho numa nova tarefa de altruísmo – Altruism-Antisocial – pode ser explicado pela psicopatia, em função do sexo. Os resultados sugerem que os traços psicopáticos não predizem o altruísmo, mas o sexo modera esta relação, com maiores níveis de psicopatia a predizer decisões menos altruístas apenas nos homens.

Palavras-chave: Psicopatia; Psicopatia Primária; Psicopatia Secundária; Sexo; Altruísmo; Tarefas Económicas; Altruism-Antisocial.

ABSTRACT

Psychopathy can be described as a cluster of personality traits, often associated with antisocial conducts, but that results in heterogeneous behaviors. It can be divided in primary psychopathy – mostly reflecting affective deficits in the relation with others – and secondary – related to impulsive and antisocial behaviors. Psychopathy has been negatively associated with measures of altruism, but this relation has not been much explored in economic decision-making tasks. Moreover, men and women tend to express psychopathic traits differently, hence it is important to further explore whether the eventual effects of these traits on altruism depends on the sex of the participants. The aim of this study was to examine how the performance in a new altruism task – the Altruism-Antisocial task – could be explained by psychopathy, according to sex. Results suggested that psychopathic traits did not predict altruism, but sex moderated this relation, in which higher levels of psychopathy predicted lower altruistic decisions only in men.

Keywords: Psychopathy; Primary Psychopathy; Secondary Psychopathy; Sex; Altruism; Economic Tasks; Altruism-Antisocial.

Introduction

For a long time, psychopathy was considered a psychopathological condition, often associated with Antisocial Personality Disorder (ASPD; Edens et al., 2006), but these constructs are distinct. ASPD results in the manifestation of deviant behavior, while psychopathy can be assessed as personality traits (Hare et al., 1991), even if there are no antisocial manifestations. Moreover, individuals with ASPD and high psychopathy traits can be characterized by different cognitive and affective profiles. For instance, Baliousis and colleagues (2019) demonstrated that ASPD and psychopathy differ in cognitive dysfunctionalities.

Despite affective, interpersonal and behavioral deficits, individuals with high psychopathic traits can behave successfully in society (White, 2014), and the most successful are able to hide these traits (Sonne & Gash, 2018). Psychopathic traits can be found in non-institutionalized samples, usually in a less pronounced way than forensic samples (Levenson et al., 1995).

Currently, psychopathy is accepted as a dimensional construct of traits, extracted from dimensions of personality. It can be manifested through callousness, deceitfulness, dominance, impulsiveness (Efferson & Glenn, 2018), egocentricity, manipulation, and poor impulse control (Bronchain et al., 2019). High scores in psychopathy are positively correlated with a socially deviant lifestyle (Edens et al., 2006) and negatively correlated with agreeableness and conscientiousness (Lilienfeld et al., 2015).

One of the dimensional perspectives divides psychopathy into two factors, first distinguished by Karpman (1948): primary and secondary psychopathy. Primary psychopathy can be characterized by an organization of personality with no conscience, guilt, binding, or generous emotions, as well as egoistic attitudes and uninhibited instinctive trends. Secondary psychopathy is mostly reflected in antisocial behaviors, resulting from emotional problems and lack of control. More specifically, primary psychopathy reflects affective deficits (Bronchain et al., 2019), expressing selfish, uncaring, and manipulative posture toward other people (Levenson et al., 1995). Secondary psychopathy is more reactive (Jonason et al., 2013), being manifested by impulsivity and a self-defeating lifestyle (Levenson et al., 1995).

In general, scientific evidence indicates that men have higher scores than women in various measures of psychopathy, both in clinical (Cale & Lilienfeld, 2002), and community samples (Gummelt et al., 2012; Jonason et al., 2013; Jonason & Davis, 2018; Kowalski et al., 2018; Levenson et al., 1995). Gender differences are significant in both categorical and dimensional measures (Cale & Lilienfeld, 2002), despite studies that report no significant differences in total psychopathy between sexes (e.g., Fekih-Romdhane et al., 2020).

At the factor level, some studies indicate that men have higher scores than women in both primary and secondary psychopathy (Jonason et al., 2013; White, 2014), while others report significant differences only in the primary form (Berg et al., 2013; Fekih-Romdhane et al., 2020; Grieve et al., 2019; Gummelt et al., 2012; Mack et al., 2011; Marion & Sellbom, 2011); this disparity is important to be studied. Differences between sexes were found in the probability of responding to certain items on the Levenson's Self-Report Psychopathy Scale (Levenson et al., 1995): for the same total score, men are more likely to respond highly to items related to boredom, impulsivity, inability to follow through with plans, egotism and actively causing harm, while women respond highly to items related to manipulation and selfishness (Gummelt et al., 2012), indicating qualitative differences in the manifestation of psychopathy according to sex.

In a systematic review, Efferson and Glenn (2018) reported that most studies on psychopathy have focused only on male samples, and sex differences in the underlying emotional, cognitive, and social processes are poorly studied or understood. Thus, there is a need to compare directly the two sexes regarding variables in the above-mentioned domains. Some of the differences in psychopathy between women and men may result from biological differences in the manifestation of physical aggression, or from differences in gender roles, through the reinforcement or punishment of society about certain behaviors.

For the explanation of these differences, empathy was highlighted as a mediator in the association between sexes and primary and secondary psychopathy (Jonason et al., 2013), and a negative association was found between the traits of psychopathy and the level of femininity (Jonason & Davis, 2018), a feature less present in men.

Psychopathic affective deficits influence moral judgment, and the callous-uncaring attitude affects actions towards others (Sonne & Gash, 2018), influencing

the cooperative behavior. In a recent review by Marsh (2019), psychopathy was pointed out as the negative extreme of a continuum of care for other people, that leads to a reduction in manifestations of prosociality, such as altruism – behaviors that are intended to benefit another individual's well-being with disregard for self-interests.

White (2014) found that primary psychopathy was positively associated with public prosocial behaviors, and negatively with anonymous and altruistic prosocial behaviors, consistently across genders. Regarding secondary psychopathy, it was also negatively related to altruism, becoming non-significant after controlling for gender and primary psychopathy. Men had higher scores than women in both types of psychopathy, and lower levels of empathy and altruism. Kowalski et al., (2019) found a negative relation between psychopathy and the facet of altruism of the Big Five (agreeableness), in addition to men presenting significantly higher levels of psychopathy, and women higher levels of altruism.

Regardless of psychopathy, studies consistently have indicated that women are more altruistic than men (Brañas-Garza et al., 2018; Kowalski et al., 2019; White, 2014). For instance, Mesch and colleagues (2011) found that women have greater tendency to donate to charity, and offer higher amounts. Since sex seems to relate with both the manifestation of psychopathic traits and altruistic behavior, this demographic characteristic could be a variable of interest to understand the relationship between the two constructs.

A possible strategy to assess altruism is to use economic decision-making tasks. The goal is to understand how individuals behave considering possible benefits for themselves and others (Berg et al., 2013). Tasks frequently used to measure altruistic behavior are the Dictator game and the Ultimatum game.

Koenigs et al., (2010) tested the performance of male inmates scoring high in primary and secondary psychopathy in the Dictator and Ultimatum games. Primary (but not secondary) psychopathy was associated with a decrease in the money offered in the Dictator game, and with decreased acceptance of “unfair” offers in the Ultimatum game (causing none of the “players” to earn any money).

Berg et al., (2013) found positive correlations between the monetary value left to the participant in the Dictator game and the traits of total and primary (but not secondary) psychopathy. In the Ultimatum game, there were positive correlations between the rejection at 30% and total, primary, and secondary psychopathy – the

higher the psychopathic traits, the greater the rejection rates, resulting in monetary loss for both players.

Similar to other economic tasks, Sakai and colleagues (2012) created an experimental task – the Altruism-Antisocial task (AIAn) – to assess altruism through Costly Helping, event in which the subjects reject his own benefit to favor another person or entity seen as “positive”. In this task, by accepting offers, participants reduce the actual donation to a charity institution. During the task, each participant is exposed to three types of trials: Active trials – in which they can accept offers; Calculation trials – where they are asked which part has more money; and Attention-Control trials – similar to the Active trials, but where there is a predictable response to assess attention. The calculation and attention-control trials are used as control conditions (see additional information in the Method section).

Through the studies carried out with the AIAn, the number of rejections and money left to the institution proved to be negatively and significantly associated with the callous-unemotional traits in adolescents (Sakai et al., 2012, 2016). A shorter version of the task also showed that its results were negatively correlated with primary and secondary psychopathy traits in young adults (Sakai et al., 2019). These were promising findings, but the samples of the studies conducted so far were exclusively composed by adolescents (Sakai et al., 2012, 2016, 2017), and only male (Sakai et al., 2016, 2017) or mostly male participants (Sakai et al., 2012). The only exception with adults was the study by Sakai et al., (2019), but the authors administered an online short form of the task and did not explore the results in terms of the participants’ sex. Thus, it is important to consider both male and female samples, particularly adults, to understand how the relation between psychopathy and altruism occurs, and how it can differ according to sex.

Another limitation of the existing studies is that none considered social desirability, even if the experimental study of altruism can induce it (Marsh, 2019), causing altruistic behavior to not be identical to the real context. In fact, social desirability can be less important in the study of psychopathy. For instance, Pechorro and colleagues (2016) found a negative relation between psychopathy and social desirability in a sample of young offenders, with no significant differences between female and male participants in social desirability. Kowalski and colleagues (2018) also demonstrated that psychopathy was negatively related to social desirability in a normative sample of adults, but in this case women showed

higher levels of social desirability. Despite some inconsistency in relation to sex, these results reflect less importance in responding in a socially accepted way in people with higher scores of psychopathy, but social desirability should still be considered whenever altruism is a variable of interest.

The main goal of this study was to investigate the effect of psychopathic traits on altruistic behavior, measured through the Altruism-Antisocial task, and examine the influence of the participants' sex on the eventual link psychopathy-altruism. Social desirability and self-reported altruism were also considered for control purposes.

The study was guided by the following hypotheses: (1) psychopathy scores negatively predict altruistic behavior; (2) primary psychopathy is a stronger predictor of altruism than secondary psychopathy; (3) the relation between psychopathy and altruism is moderated by the participants' sex, with a weaker relation for female participants.

Method

1. Participants

A total of 114 adults (58 women) were recruited from the community to this study. The inclusion criteria were 18 years old or older, and fluency in Portuguese. The only *a priori* exclusion criterion was having any type of relation with the charity institution (Red Cross). However, participants that did not view the charity institution as positive, had technical errors, did not submitted the AIAn task, or did not comprehend the task, were also excluded. Then, we excluded outliers based on the number of trials not responded, accuracy in the attention-control trials, and accuracy in the calculation trials of the AIAn task. The final sample was composed of 87 subjects (44 women), aged between 18 and 48 years old ($M = 24.6$, $SD = 5.95$), and between 10 and 19 years of formal education ($M = 15.0$, $SD = 1.73$). Men and women did not statistically differ in these characteristics.

The study was approved by the institutional ethics committee and all participants gave informed consent before their participation.

2. Materials and Instruments

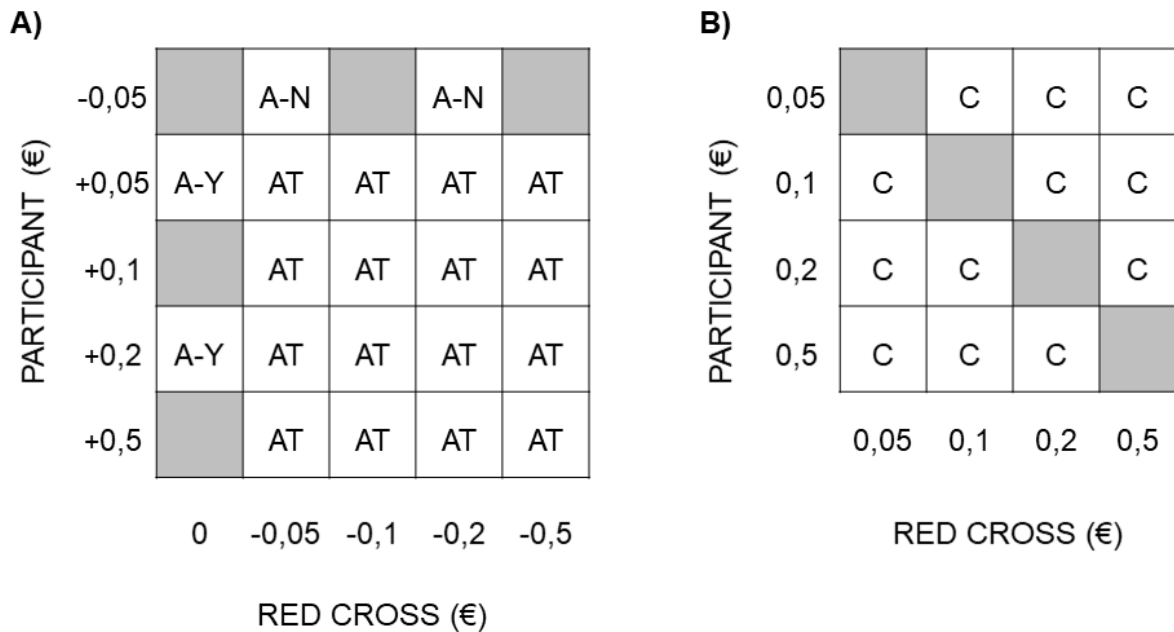
2.1. Altruism-Antisocial Task (AIAn)

The AIAn (Sakai et al., 2012, 2016, 2017, 2019) is an economic decision-making task, developed to understand how participants accept or reject monetary proposals for themselves, in exchange for monetary losses of a donation for a charity institution, in this case, the Red Cross. Before the task itself, it is presented a ≈ 2 min video about the positive contributions of the charity, and the participants answered how much good they thought the Red Cross does (0 = No good at all; 100 = Lots of good).

The task was prepared and applied remotely through lab.Js (Henninger et al., 2020), and was adapted to euros. Figure 1 represents the matrix of the division of the trials. Each trial appeared 2 times for each participant, and they were presented with 64 trials (each with approximately 12 seconds), divided into three conditions: (a) 32 Active trials, where the participant can accept proposals for monetary changes (e.g., "Accept the transaction? You: +0.50 €; Red Cross: -0.05 €"); 24 Calculation trials, in which participants are asked if their value is greater than the charity's; (c) and 8 Attention-Control trials, where proposals have predictable responses with no reason to choose differently (e.g., "Accept the transaction? You: +0.20 €; Red Cross: 0 €"). The purpose of the last two types of trials was to respectively verify if the participants understood the relative numerical values in Active trials, and to monitor their attention. The order of the presentation of the trials was randomized for each participant. To give an answer to the question on each trial, the participants had to press "S" for "yes" or "N" for "no" on the keyboard. Figure 2 represents an example of each type of trial, and Figure 3 shows the trials' sequence. It was stated that at the end of the task, the money accumulated for the charity would be donated to it.

Figure 1

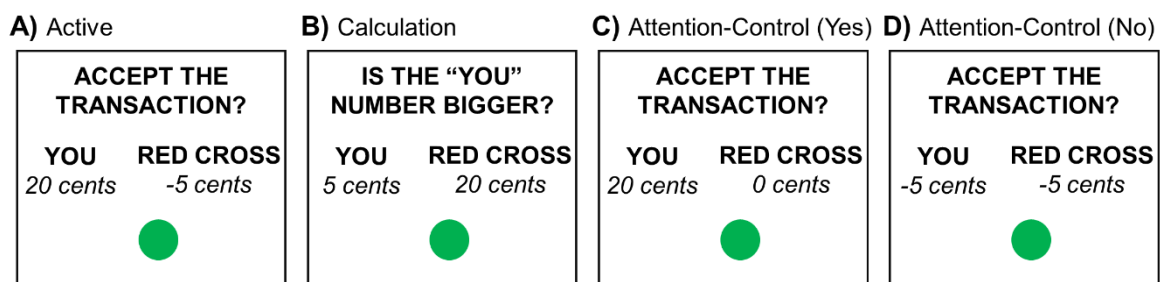
Matrix of the trials of the Altruism-Antisocial task



Note. Panel A) AT – Active trials; A-Y – Attention-Control “Yes” trials (expected response is “yes”); A-N – Attention-Control “No” trials (expected response is “no”). Panel B) C – Calculation trials.

Figure 2

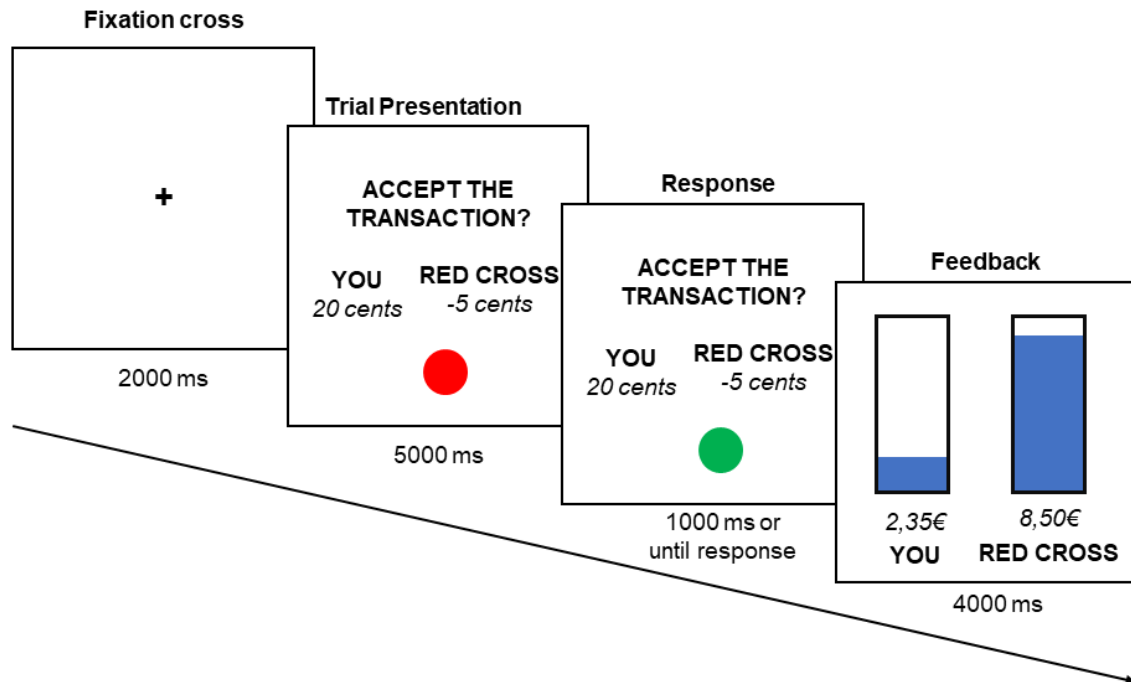
Examples of the screen of the different trials in the AIA task



Note. A) Active trial; B) Calculation trial. C) Attention-control “Yes” trial; D) Attention-control “No” trial. For the participants, the Active and Attention-control trials were visually the same, and the responses had impact in the money. The calculation trials did not impact the money of the participant and charity.

Figure 3

Example of a Trial sequence



The participants' gains were converted into numbers for a 25 € prize draw (based on a public lottery), so the more trials they accepted, the higher the probability of winning the prize. During the debriefing, it was explained that the donation to the Red Cross was not real, but that the prize draw was, and if the number drawn was not attributed to any participant, the experimenters would donate the 25 € to the charity institution.

The following AIAn measures were analyzed: (a) the *money donated* to the charity as a measure of altruism; (b) the *money kept* for the participant as a measure of antisociality; (c) the number of *active trials not accepted* as a measure of costly helping; (d) and accuracy in the *calculation and attention-control* trials as measures of participants' engagement.

2.2. Levenson Self-Report Psychopathy Scale (LSRPS)

The LSRPS (Levenson et al., 1995) is used to measure psychopathic traits in non-institutionalized samples. It consists of 26 items, responded on a 4-point Likert scale (1 = Strongly Disagree; 2 = Somewhat Disagree; 3 = Somewhat Agree; 4 = Strongly Agree). The LSRPS is divided into two subscales: (a) primary psychopathy (16 items); and (b) secondary psychopathy (10 items). The items in

the primary psychopathy subscale are intended to assess selfish, uncaring, and manipulative attitudes towards others (e.g., “Success is based on survival of the fittest; I am not concerned about the losers”), while the items of secondary psychopathy are intended to assess impulsivity and a self-defeating lifestyle, more related to emotional disorders (e.g., “I am often bored”). Some items are reversed. It was used the Portuguese version by Barbosa et al. (2014) and obtained measures for total, primary, and secondary psychopathy.

2.3. Altruistic Attitudes Scale (AAS)

The AAS (Loureiro & Lima, 2009) is a Portuguese self-report scale, composed of 12 items responded on a 5-point Likert scale (e.g., 1 = Totally disagree/Very bad/never; 5 = Totally agree/Very good/Many times). It comprises three subscales – cognitive, affective, and behavioral – with 4 items each. The *cognitive* subscale refers to the agreement with statements related to altruism (e.g., “I think that, in this world, everyone has to take care of themselves”). The *affective* refers to the assessment of how the subject would feel when performing a certain altruistic action (e.g., “Taking care of someone without waiting for a reward”). Finally, the *behavioral* subscale assess how often the person performs certain altruistic behaviors (e.g., “Indicate street directions to an unknown person”). Some items are reversed. The total score of this scale and the scores of the different subscales were used as measures of altruistic attitudes for control purposes (AIAn measures of altruistic behavior were expected to correlate significantly with these scores).

2.4. Socially Desirable Response Set Five-Item (SDRS-5)

The SDRS-5 (Hays et al., 1989) is a self-report scale that assesses the tendency to give socially accepted responses, increasing the respondents’ positive self-image (Pechorro et al., 2019). It consists of five items responded on a 5-point Likert scale (1 = Definitely true; 5 = Definitely false). It was applied the Portuguese version by Pechorro et al. (2016), and its score was used as a control variable.

3. Procedures

The sample was recruited from the community, through social media. After giving informed consent, participants filled a questionnaire with the sociodemographic information. Then, it was applied the Altruism-Antisocial task. At the end, they responded to the self-report measures in a counterbalanced order across participants.

Regarding data analysis, we first computed descriptive statistics. Then, after checking for proper assumptions, we used simple linear regressions to test whether the total score of the psychopathy scale (predictor variable) significantly predicts the altruism measures (in separate models) derived from the AIAn task (response variables), thus testing for hypothesis 1 (*The psychopathy scores negatively predict the altruistic behavior*). The hypothesis 2 (*Primary psychopathy is a stronger predictor of altruism than secondary psychopathy*) was tested through multiple linear regressions, having the scores of both types of psychopathy as predictor variables and the results of the AIAn task as response variables (in separate models). For the hypothesis 3 (*The relation between psychopathy and altruism is moderated by the participants' sex, with weaker relation in female participants*) we computed moderation models, with sex as moderator (dichotomous moderator variable) of the relationship between psychopathy (here considered independent variable) and the altruistic behavior (dependent variable, with different AIAn measures in separate models).

Correlations were computed between the measures of AIAn and control variables (namely the need for 25€, the total score of the Altruistic Attitudes Scale and the total score of Social Desirability scale). The need for the 25€ was negatively correlated with costly helping, $r(85) = -.249$, $p = .020$, and money for charity, $r(85) = -.326$, $p = .002$. This variable was previously considered in the statistical models, but it did not change the effects of the independent on the dependent variables, nor the relations between them. Thus, none of the control variables entered the statistical models that produced the results reported below.

Standardized residuals were analyzed for outlier detection in regression models, and one participant was removed from two of these models. In addition, we had no multicollinearity problems, except in the moderation models, in which the

introduction of the psychopathy*sex interaction made VIF > 10, as usually occurs when interaction between predictors is considered in multiple regressions.

In cases where the values needed to be adjusted, they are reported already corrected.

Results

1. Descriptive Analysis

The descriptive statistics of the self-report scales, and respective independent samples t-test between sexes, are reported in table 1. The only differences between men and women are in primary psychopathy, total psychopathy, and total altruistic attitudes. Men scored higher than women in both primary and total psychopathy and lower in total altruistic attitudes.

Table 1

Descriptive Statistics and Independent Samples t-test of the Sociodemographic data and Self-report Measures for the total sample, male, and female participants

	Total (<i>n</i> = 87) <i>M</i> (<i>SD</i>)	Male (<i>n</i> = 43) <i>M</i> (<i>SD</i>)	Female (<i>n</i> = 44) <i>M</i> (<i>SD</i>)	Sex differences (t-test)
Psychopathy				
Primary	25.7 (5.64)	27.2 (5.46)	24.2 (5.46)	$t(85) = 2.59; p = .011$
Secondary	19.6 (4.73)	20.2 (4.18)	19.0 (5.19)	$t(85) = 1.17; p = .244$
Total	45.3 (8.57)	47.4 (7.47)	43.2 (9.13)	$t(85) = 2.35; p = .021$
Altruistic Attitudes				
Cognitive	16.9 (2.29)	16.6 (2.26)	7.30 (2.30)	$t(85) = -1.46; p = .147$
Affective	18.2 (1.86)	17.9 (2.09)	18.4 (1.59)	$t(78.4) = -1.32; p = .192$
Behavioral	17.1 (2.57)	16.7 (2.59)	17.5 (2.53)	$t(85) = -1.34; p = .184$
Total	52.2 (4.23)	51.2 (4.54)	53.2 (3.71)	$t(85) = -2.22; p = .029$
Social Desirability	17.1 (3.01)	16.7 (2.67)	17.5 (3.28)	$t(85) = -1.25; p = .216$

Note. Psychopathy was assessed by the Levenson Self-Report Psychopathy Scale (Levenson et al., 1995), Altruistic Attitudes was assessed by the Altruistic Attitudes Scale (Loureiro & Lima, 2009) and Social Desirability was assessed by Socially Desirable Response Set Five-Item (Hays et al., 1989).

The descriptive statistics and independent samples t-test of the AIAn task are presented in table 2. There were no differences between men and women in any of the measures. Regarding costly helping, the sample rejected on average 83.8% of the active trials. Beyond that, participants responded correctly to an average of 91.3% of attention-control trials and 96.3% of the calculation trials.

Table 2

Descriptive Statistics and Independent Samples t-test of Altruism-Antisocial Measures for the total sample, male, and female participants

	Total (<i>n</i> = 87) <i>M</i> (<i>SD</i>)	Male (<i>n</i> = 43) <i>M</i> (<i>SD</i>)	Female (<i>n</i> = 44) <i>M</i> (<i>SD</i>)	Sex differences (<i>t</i> -test)
Charity Scale	91.5 (9.83)	90.4 (10.4)	92.5 (9.29)	$t(85) = -0.976, p = .332$
Costly Helping	26.8 (5.58)	26.7 (5.68)	27.0 (5.54)	$t(85) = -0.233; p = .816$
Money				
Charity	9.39 (0.849)	9.37 (0.818)	9.40 (0.887)	$t(85) = -0.121; p = .904$
Participant	2.12 (1.67)	2.18 (1.76)	2.06 (1.60)	$t(85) = 0.342; p = .733$
Correct				
Attention-Control	7.30 (1.14)	7.35 (1.09)	7.25 (1.20)	$t(85) = 0.402; p = .689$
Calculation	23.1 (1.67)	23.0 (1.73)	23.2 (1.63)	$t(85) = -0.571; p = .570$
No Response	1.32 (1.71)	1.23 (1.56)	1.41 (1.86)	$t(85) = -0.480; p = .633$

Note. The Charity Scale corresponds to the participants' response on a 0-100 point scale about how much good they think the charity institution does. Costly Helping was calculated by the number of active trials not accepted.

2. Hypothesis testing

2.1. H1: Psychopathy scores negatively predict altruistic behavior

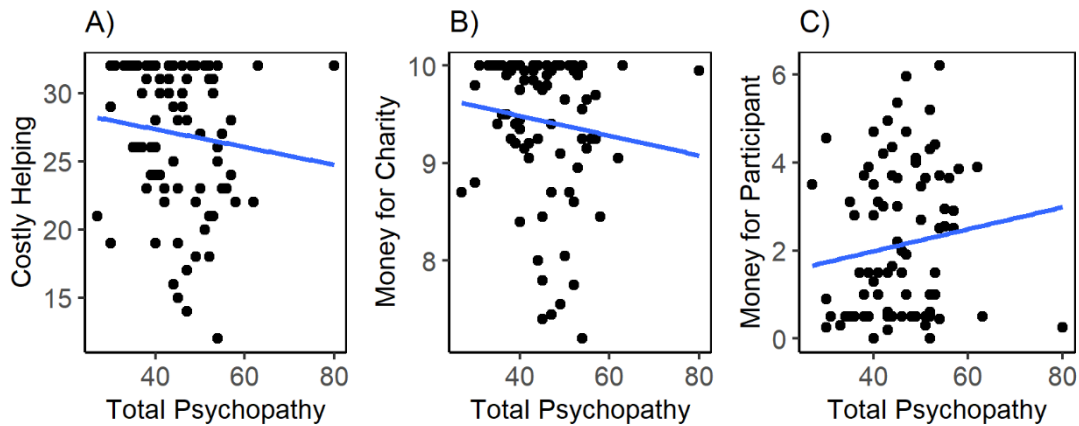
Simple linear regressions were computed to test the hypothesis 1 separately for each outcome variable. It was verified that total psychopathy does not significantly predict variance in costly helping, $R^2 = .011$, $F(1, 84) = 0.953$, $p = .332$ ($B = -0.065$, $t(84) = -0.975$, $p = .332$), nor money for charity, $R^2 = .014$, $F(1, 84) = 1.23$, $p = .271$ ($B = -0.010$, $t(84) = -1.11$, $p = .271$), nor money for participant, $R^2 =$

.016, $F(1, 85) = 1.42$, $p = .237$ ($B = 0.025$, $t(85) = 1.19$, $p = .237$). Figure 4 shows the correlations between total psychopathy and each altruistic measure.

With these results, hypothesis 1 is not confirmed.

Figure 4

Correlations and linear regression line between Total Psychopathy and (a) Costly Helping, (b) Money for Charity, and (c) Money for Participant



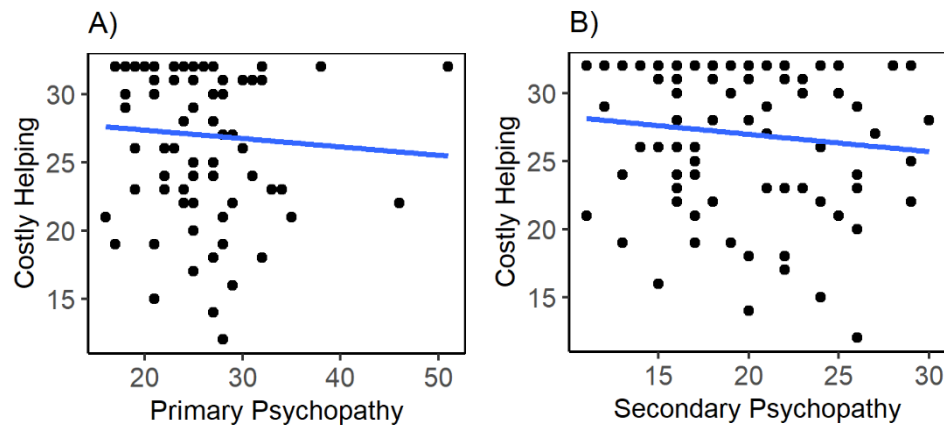
2.2. H2: Primary psychopathy is a stronger predictor of altruism than secondary psychopathy

To test hypothesis 2, it were computed separate multiple linear regressions for each outcome variable.

Primary and secondary psychopathy do not significantly predict costly helping, $Adj. R^2 = -.010$, $F(2, 83) = 0.575$, $p = .565$. Secondary psychopathy was slightly more related to costly helping ($\beta = -.104$, $t(83) = -0.888$, $p = .377$) than primary psychopathy ($\beta = -.028$, $t(83) = -0.235$, $p = .815$), but none of these relations are significant. Figure 5 represents the correlations between each factor of psychopathy and costly helping.

Figure 5

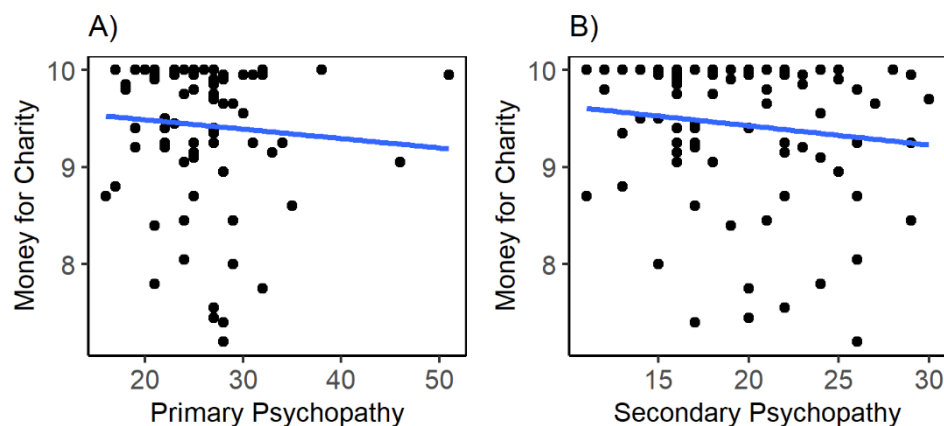
Correlations between (a) Primary Psychopathy and Costly Helping, and (b) Secondary Psychopathy and Costly Helping



Primary and secondary psychopathy did not significantly predict money for charity, $Adj. R^2 = -.006$, $F(2, 83) = 0.736$, $p = .482$. Again, secondary psychopathy was slightly more related to money for charity ($\beta = -.117$, $t(83) = -1.00$, $p = .320$) than primary psychopathy ($\beta = -.032$, $t(83) = -0.273$, $p = .785$), with no statistical significance in any case. Figure 6 shows the correlation between money for charity and the types of psychopathy.

Figure 6

Correlations between (a) Primary Psychopathy and Money for Charity, and (b) Secondary Psychopathy and Money for Charity

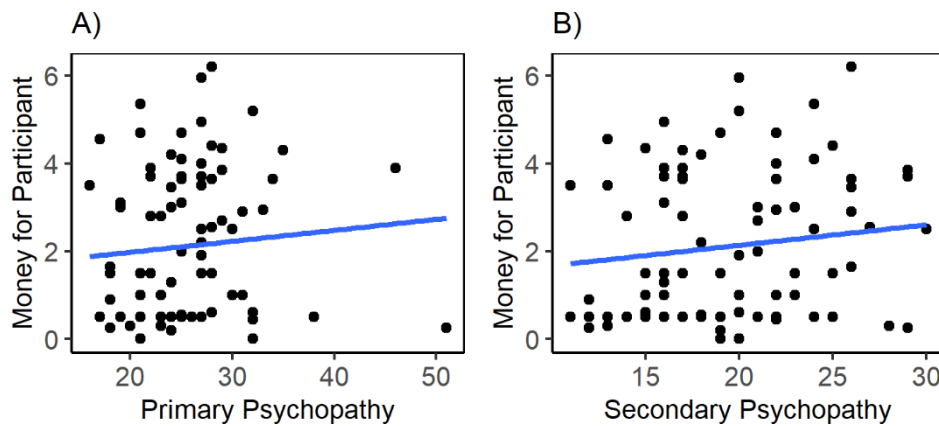


Concerning the money for participant, the model with primary and secondary was, again, non-significant, $Adj. R^2 = -.004$, $F(2, 84) = 0.808$, $p = .449$, with secondary psychopathy being slightly more associated with the outcome variable ($\beta = .117$, $t(84) = 1.01$, $p = .318$) than primary psychopathy ($\beta = .042$, $t(84) = 0.361$, $p = .719$), without reaching significance. Figure 7 shows the correlations between money for participant and the two types of psychopathy.

Taken all results together, the hypothesis 2 was not verified.

Figure 7

Correlations between (a) Primary Psychopathy and Money for Participant, and (b) Secondary Psychopathy and Money for Participant



2.3. H3: The relation between psychopathy and altruism is moderated by the participant's sex, with a weaker relation for female participants

Lastly, to test hypothesis 3, we computed moderation models for each measure of AIAn.

Figure 8 shows the relation between total psychopathy and costly helping, depending on the participants' sex. To analyze the moderation, we did linear regression analyses, entering total psychopathy and sex (dummy coded; 0 = male, 1 = female) as covariates and costly helping as dependent variable. Although the model was not significant, $Adj. R^2 = .027$, $F(3, 82) = 1.78$, $p = .157$, both total psychopathy, $\beta = -.377$, $t(82) = -2.03$, $p = .035$, and psychopathy*sex interaction, $\beta = 1.22$, $t(82) = 2.06$, $p = .043$, were significant predictors. Sex, $\beta = -1.20$, $t(82) = -1.96$, $p = .054$, was a marginally significant predictor of costly helping. The

interaction suggests that participants' sex moderates the relation between total psychopathy and costly helping.

In men, total psychopathy explained 9.3% of the variance in costly helping, $R^2 = .093$, $F(1, 41) = 4.21$, $p = .047$, being a significant predictor of this measure of altruism, $B = -0.232$, $t(41) = -2.05$, $p = .047$. In women, the model was not significant, $R^2 = .010$, $F(1, 41) = 0.421$, $p = .520$, so total psychopathy is not a significant predictor of costly helping ($B = 0.054$, $t(41) = 0.649$, $p = .520$).

Figure 8

Relation between total psychopathy and costly helping depending on participants' sex

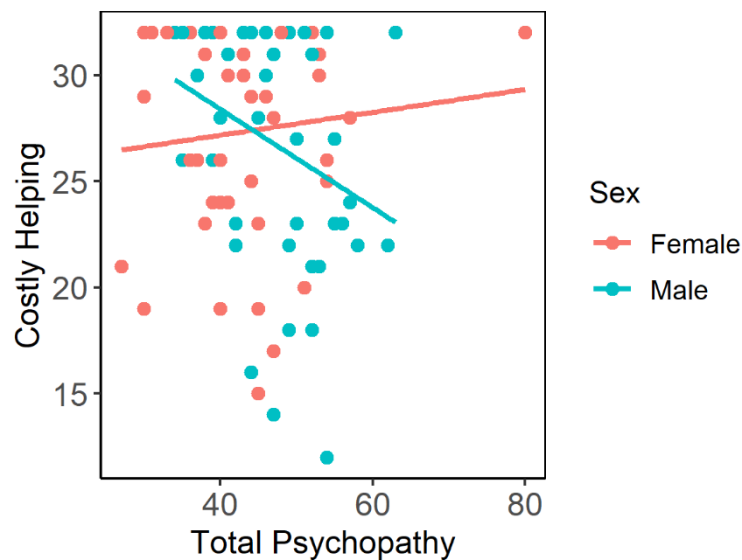


Figure 9 shows the relation between total psychopathy and the money for charity, depending on participants' sex. The model is not significant, $Adj. R^2 = .022$, $F(3, 82) = 1.63$, $p = .188$. Additionally, total psychopathy is a significant predictor, $\beta = -0.360$, $t(82) = -2.04$, $p = .044$. Sex ($\beta = -1.06$, $t(82) = -1.73$, $p = .088$) and its interaction with psychopathy ($\beta = 1.10$, $t(82) = 1.85$, $p = .068$) are marginally significant predictors in the model. In this sense, sex was a marginally significant moderator the relation between total psychopathy and money for charity.

In men, total psychopathy explained 7.80% of the variance of money for charity, $R^2 = .078$, $F(1, 41) = 3.45$, $p = .070$, being a marginally significant predictor of this measure of altruism, $B = -0.031$, $t(41) = -1.86$, $p = .070$. For women, the model was not significant, $R^2 = .005$, $F(1, 41) = 0.213$, $p = .647$, and total

psychopathy is not a significant predictor of money for charity ($B = 0.005$, $t(41) = 0.462$, $p = 0.647$).

Figure 9

Relation between total psychopathy and money for charity depending on participants' sex

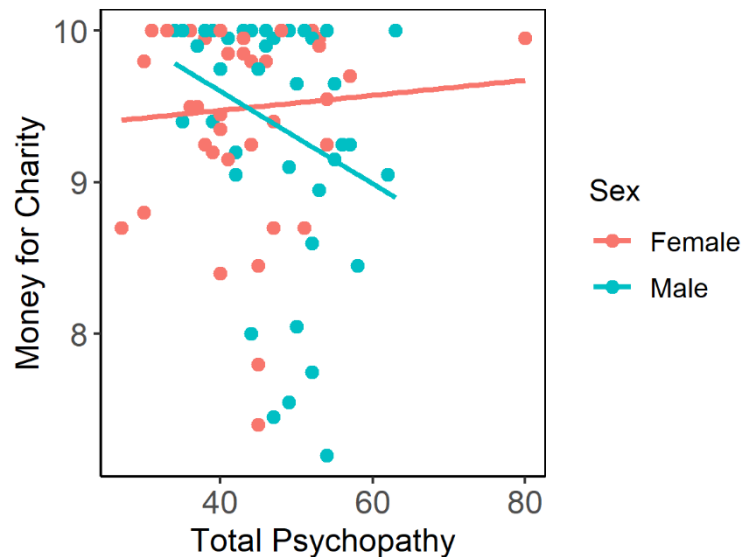
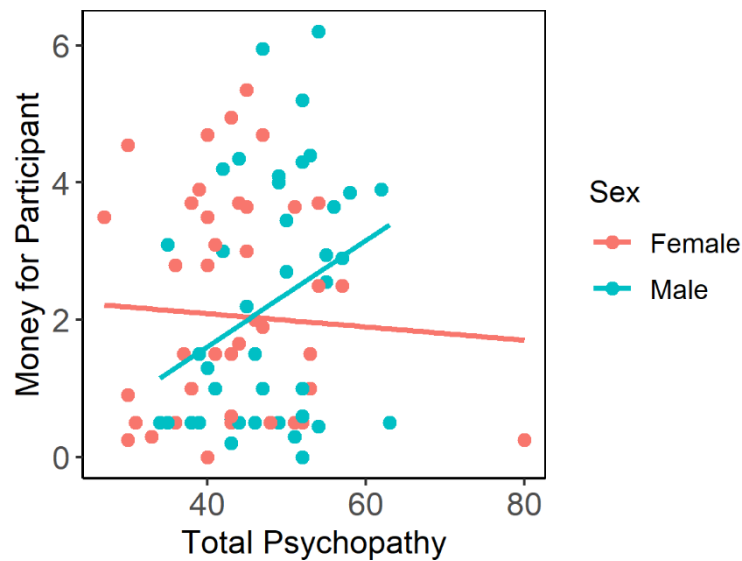


Figure 10 represents the relation between total psychopathy and the money for the participant, considering the participants' sex. Although the model was not significant, $Adj. R^2 = .027$, $F(3, 83) = 1.80$, $p = .154$, total psychopathy was a significant predictor ($\beta = .396$, $t(83) = 2.27$, $p = .026$), sex was marginally significant ($\beta = 1.19$, $t(83) = 1.94$, $p = .055$), and the interaction between the two variables was significant ($\beta = -1.18$, $t(83) = -1.99$, $p = .050$), showing that participants' sex moderates the relation between total psychopathy and the money left for the participant.

In men, the total psychopathy significantly explained 10.8% of the variance in money for participant, $R^2 = .108$, $F(1, 41) = 4.96$, $p = .031$, with higher levels of total psychopathy predicting more money for the participant ($B = 0.077$, $t(41) = 2.23$, $p = .031$). In turn, the model was not significant for women, $R^2 = .003$, $F(1, 42) = 0.128$, $p = .723$, meaning that the total psychopathy is not a predictor of the money for the participant ($B = -0.010$, $t(42) = -0.357$, $p = .723$).

Figure 10

Relation between total psychopathy and money for the participant, depending on participants' sex



Taken into account the significant and marginally significant results, they tend to confirm the hypothesis 3.

3. Additional analysis

3.1. Correlation between self-report and AIAn measures

Table 3 shows all correlations between the self-report measures and the altruism measures from the AIAn task.

Total, primary and secondary psychopathy scores are significantly and negatively correlated with the total scores of the Altruistic Attitudes Scale, as well as with the scores of the cognitive subscale. Secondary and total psychopathy are negatively correlated with affective altruistic attitudes. All measures of psychopathy were significantly and negatively correlated with social desirability. Of note, self-reports of affective altruism and total scores on the Altruistic Attitudes Scale seem to be affected by social desirability, given the significant positive correlation between these measures.

Unexpectedly, the measures of AIAn did not significantly correlate with any of the dimensions of the Altruistic Attitudes scale, nor with its total score.

Table 3*Correlation between the self-reported and AIAn measures*

	PP	SP	TP	CAA	AAA	BAA	TAA	SD	CH	MC	MP
LSRP Scale											
Primary Psychopathy (PP)	—										
Secondary Psychopathy (SP)	0.363***	—									
Total Psychopathy (TP)	0.858***	0.790***	—								
Altruistic Attitudes Scale (AAS)											
Cognitive Altruistic Attitudes (CAA)	-0.527***	-0.289**	-0.506***	—							
Affective Altruistic Attitudes (AAA)	-0.180	-0.216*	-0.237*	0.071	—						
Behavioral Altruistic Attitudes (BAA)	-0.137	-0.004	-0.092	-0.058	0.279**	—					
Total Altruistic Attitudes (TAA)	-0.448***	-0.254*	-0.435***	0.538***	0.648***	0.698***	—				
Social Desirability (SD)	-0.493***	-0.502***	-0.601***	0.128	0.371***	0.075	0.278**	—			
Altruism-Antisocial Task											
Costly Helping (CH)	-0.070	-0.080	-0.090	0.180	0.031	-0.046	0.083	0.031	—		
Money for Charity (MC)	-0.077	-0.067	-0.088	0.193	-0.004	-0.027	0.087	-0.011	0.931***	—	
Money for Participant (MP)	0.084	0.132	0.128	-0.166	-0.033	0.001	-0.104	-0.086	-0.957***	-0.837***	—

Note. LSRP = Levenson Self-Report Psychopathy; PP = Primary Psychopathy; SP = Secondary Psychopathy; TP = Total Psychopathy; CAA = Cognitive Altruistic Attitudes; AAA = Affective Altruistic Attitudes; BAA = Behavioral Altruistic Attitudes; TAA = Total Altruistic Attitudes; SD = Social Desirability; CH = Costly Helping; MC = Money for Charity; MP = Money for Participant

* $p < .05$, ** $p < .01$, *** $p < .001$

3.2. Grouping Psychopathic levels

To examine whether participants scoring higher in psychopathy perform differently from those scoring lower in the AIAn task, we divided the sample into two groups based on the LSRP scores: the lower and the higher terciles of total psychopathy. The lower psychopathy group comprised 30 participants (20 women), scoring 41 or less in total psychopathy ($M = 36.6$, $DP = 3.87$), while the higher comprised 31 participants (9 women), scoring 49 or higher ($M = 54.3$, $DP = 5.83$).

There were no differences between groups regarding costly helping, $t(59) = 1.654$, $p = .103$. In terms of money for charity, $t(47.1) = 1.99$, $p = .052$, $d = 0.506$, and money for participant, $t(59) = -1.817$, $p = .074$, $d = -0.465$, the differences were marginally significant, with the lower psychopathic group leaving more money for the charity ($M = 9.64$, $SD = 0.446$) and accumulating less money for themselves ($M = 1.68$, $SD = 1.46$) than the higher psychopathic group ($M = 9.31$, $SD = 0.808$, and $M = 2.42$, $SD = 1.71$, respectively).

Separate 2-way ANOVAs were computed to analyze the effect of group (higher, lower psychopathy) and sex (male, female) on the AIAn measures.

Neither group, $F(1,57) = 2.00$, $p = .163$, nor sex, $F(1,57) = 0.025$, $p = .875$ significantly explained costly helping, but their interaction was significant, $F(1,57) = 5.21$, $p = .026$, $\eta^2_p = .084$. Figure 11a represents the descriptive plot of the ANOVA. A Tukey post-hoc test revealed differences in the costly helping for men between the group scoring lower ($M = 30.1$, $SD = 2.51$) and higher in psychopathy ($M = 25.2$, $SD = 5.72$).

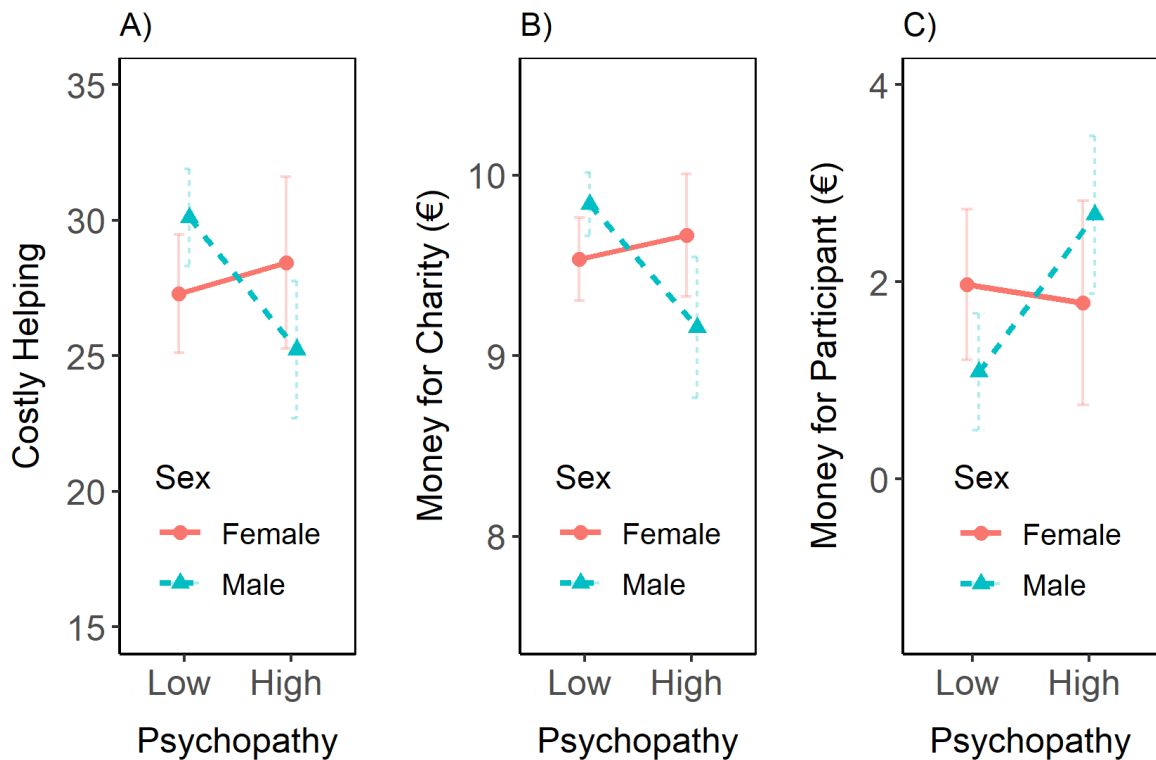
Regarding the money left for the charity, there was no main effect of group, $F(1,57) = 2.451$, $p = .123$, nor sex, $F(1,57) = 0.338$, $p = .563$, but there was an interaction, $F(1,57) = 5.35$, $p = .024$, $\eta^2_p = .086$. Figure 11b shows the descriptive plot of the ANOVA. Tukey post-hoc revealed differences for men between the lower group in psychopathy ($M = 9.84$, $SD = 0.245$) and higher ($M = 9.16$, $SD = 0.882$) in this measure of altruism.

Concerning the money for the participant, there was no main effect of group, $F(1,57) = 2.63$, $p = .111$, nor sex, $F(1,57) = 8.36 \times 10^{-5}$, $p = .993$, but there was an interaction effect, $F(1,57) = 4.20$, $p = .045$, $\eta^2_p = .069$. Figure 11c shows the descriptive plot of the ANOVA. Tukey post-hoc revealed differences for men

between the lower ($M = 1.09$, $SD = 0.828$) and higher psychopathy groups ($M = 2.68$, $SD = 1.81$) regarding this measure of altruism.

Figure 11

Costly helping (a), Money for charity (b) and Money for participant (c) as result of interaction of group of psychopathy and sex



Note. Error-bars represent 95% confidence interval.

Discussion

The main goal of this study was to understand the relation between the psychopathic traits – assessed by the Levenson's psychopathy scale (Levenson et al., 1995) – and the altruistic measures of Altruism-Antisocial task (AIAn) (Sakai et al., 2012, 2016, 2017, 2019), taking into account the putative influence of sex in the results. More precisely, we sought to test three hypotheses: (H1) Psychopathy scores negatively predict altruistic behavior; (H2) Primary psychopathy is a stronger predictor of altruism than secondary psychopathy; (H3) The relation between

psychopathy and altruism is moderated by the participants' sex, with weaker relation for female participants.

For the purpose of testing the above-mentioned hypotheses, we recruited 114 participants (87 illegible) and administered a protocol consisting of the application of the AIAn task, and three self-report scales – the Levenson Self-Report Psychopathy Scale (Levenson et al., 1995), the Altruistic Attitudes Scale (Loureiro & Lima, 2009) and the Socially Desirable Response Set Five-Item (Hays et al., 1989), to assess psychopathy, altruistic attitudes, and social desirability, respectively.

Firstly, total psychopathic scores did not predict the altruistic measures from AIAn, namely the costly helping, the money left for the charity and the money gained by the participant. Thus, the hypothesis 1 was not confirmed. The inexistence of a significant relation between the said variables do not match the study of Sakai and colleagues (2019), where regression analyses showed that costly helping was significantly predicted by the total psychopathy. Thus, the result in the present study is not expected. Besides the results from Sakai and colleagues' study (2019), psychopathy has also been correlated with other measures of altruism or other forms of prosocial behavior in previous studies (e.g., Berg et al., 2013; Koenigs et al., 2010), in the sense that the higher the psychopathic traits, the less altruistic a person is.

Despite the results from regression analyses, by dividing participants into groups with lower and higher levels of psychopathy, we observed marginally significant differences between the two groups regarding the money left for the charity and gained by the participant. Specifically, the group of participants with lower psychopathy scores left more money to the charity and accumulated less money for themselves, following the literature that shows that high levels of psychopathy are related to low altruism.

Primary and secondary psychopathy also failed to significantly predict the altruism measures from AIAn, and neither revealed a significant relation with these measures. Thus, the second hypothesis was not confirmed either. This fact is also not matched with the study of Sakai et al. (2019), where primary and secondary psychopathy predicted costly helping. Furthermore, after White's (2014) work, for example, one would expect primary psychopathy to be more predictive of altruistic behavior than secondary. Indeed, in that study, primary and secondary

psychopathy were negatively correlated with altruistic behaviors, but secondary was less significant, and became non-significant after controlling gender and primary psychopathy.

The inexistence of psychopathy effect on altruism can be explained by the idea proposed by Hart and colleagues (2018) that people with dark traits may often provide helping behaviors to present a good impression when that is beneficial to them. Therefore, the task could have been responded according to a “beneficial impression management”, and participants’ decisions may have been biased to present themselves positively. However, it must be noted that we found no significant association of social desirability with the measures of altruism. Moreover, psychopathy scores correlated negatively with social desirability.

This raises the possibility that psychopathy may relate differently to different measures of altruism. In this task, altruism is measured by the act of not accepting money or otherwise reduce a donation to charity. In other studies, the recipient of the money is another participant, either real or fictitious. Plus, here, we made sure that the participants viewed the charity institution as positive by showing a video and assessing that view. Therefore, altruism measures in this task may be somehow different from other tasks where psychopathy predicts altruism.

Another focus of our study had to do with the influence of the participants’ sex in the relation between psychopathic traits and altruistic behavior. Taking into consideration the significant and marginally significant results, our moderation models showed that there was an interaction between psychopathy and sex to predict costly helping, the money left for the charity and the money gained by the participants. For men, total psychopathy predicts the altruistic measures, but not for women. Higher levels of psychopathy are associated with less trials not accepted, less money for the charity and more money remaining for participants. This means that the higher the psychopathic traits, the lower the altruistic behavior for men, but not for women.

The pattern was the same when using the ANOVA approach, but in this case men with higher and lower levels of psychopathy differed in all altruistic measures. Specifically, men with higher psychopathy scores had lower costly helping indicator, left less money for the charity, and gained more money. For women there were no differences between higher and lower psychopathy scorers; hence psychopathy does not influence the altruistic behavior in women, at least in this task. The relation

between psychopathy and altruism being significant only in men means that altruistic behavior is partly influenced by the psychopathic traits, but for women this is not true. Women with higher levels of psychopathy manifested similar costly helping and left the same money for them and the charity as women with lower levels of psychopathy. This result should be the focus of future investigations.

Brañas-Garza and colleagues (2018) report that women are more altruistic and are expected to be more altruistic than men, both by men and women. This could mean that men, unlike women, are more volatile and likely to vary their prosocial behavior depending on other personality characteristics, as is the case of psychopathy traits. Our results could also be influenced by other factors that moderate the relation between sex and altruism, as is the case of empathy (Kamas & Preston, 2021), or by the nature of psychopathy measures, as studies have argued that psychopathy should be assessed differently in men and women. For instance, Gummelt et al. (2012) reported qualitative differences from men and women when responding to the Levenson's psychopathy Scale. It was stated that men tend to endorse items related to impulsivity and women to more passive items. One possibility is to reformulate the way psychopathy is assessed, to reduce sex and gender differences in the expression of psychopathic traits.

Interestingly, it was found that psychopathy was negatively related to self-reported measures of altruism. Namely, primary psychopathy significantly correlated with the cognitive and total altruistic attitudes, and both the secondary and total psychopathy scores were negatively correlated with the cognitive, affective, and total altruistic attitudes. These results follow, for example, the study of Carvalho et al., (2020), that also used the Altruistic Attitudes Scale (Loureiro & Lima, 2009), and where each dimension was negatively associated with the total psychopathy.

In addition, measures from AIAn did not correlate with any factor on the Altruistic Attitudes Scale. This situation raises the question whether the adapted Altruism-Antisocial task is effectively measuring altruism or the participants' perception of own altruism does not correspond to its behavioral expression.

Some limitations shall be discussed. First, the sample was mainly recruited in students' online communities, and most participants were undergraduate or graduate students. It would be relevant to analyze if the same results would be encountered in more diverse samples of adults, and/or with other sampling

strategies. With a larger sample, marginal effects will probably become significant and other relations between psychopathy and altruistic measures may emerge. Particularly when participants were organized in groups of higher and lower psychopathy, the sample sizes regarding women and men in these groups became unbalanced. It is important to understand whether the same effects are maintained when the sample is larger and balanced regarding participants' sex.

Second, our version of the Altruism-Antisocial task is different than the ones that have been previously applied and was administered online. Despite the advantages in this format, it is important to note that we could not control with certainty whether the participants responded attentively, without interference, and whether they completed all steps correctly, for instance if they watched the video of the charity institution. Also, the number of trials that we used was not as large as the original tasks (Sakai et al., 2012, 2016, 2017), although not as small as the study by Sakai et al. (2019) where the psychopathy was studied. Changing the study from dollars to euros, or the initial hypothetical donation to the charity that started at 10€ in our study (versus 16\$ in the original study), are other differences that may have altered the relation between gains and donations, possibly influencing altruistic behavior (for example, starting the donation at a higher level could give the participants more space to accept trials). Thus, it is difficult to directly compare the results of this study with those already carried out.

Third, the psychopathic traits were measured by a self-report scale, and it is known that this measuring method has shortcomings, namely related to social desirability. Nonetheless, we measured social desirability and it was negatively correlated with all measures of psychopathy. This means that people scoring higher in psychopathy, score low on social desirability, suggesting that their performance in the task is not being influenced by social expectations. In turn, the negative correlations between measures of psychopathy and social desirability may also mean that lower scores in the Levenson's psychopathy scale are being influenced by social desirability and, in fact, these scores would be higher. Anyhow, it is worth mentioning that controlling for social desirability did not change the results reported here.

Finally, the gains in the task were reflected in a probability to win a monetary prize, in contrast to the original game in which there was a direct monetary gain. The perspective of a long-term and uncertain gain, rather than an immediate and

certain one, could have changed the nature of the task and explain why the expected relations between its measures of altruism and psychopathy traits were not confirmed. Directly giving the money gained in the task to the participants could be more effective in inducing altruistic behavior. It would be important to address this issue in future studies.

Despite the above-mentioned limitations, this study has positive implications. Firstly, the effects of psychopathy, sex, and their interaction on altruistic behavior was explored for the first time. We obtained interesting results that should be pursued in further researched. More specifically, the effect of psychopathy on altruism is different in men and women. The reasons for this interaction should be further explored. Secondly, we adapted a new task that has promising ability to answer research questions about altruism. Thus, our study can help making further adaptations in the task to get the best out of it.

It would be important for future investigations to take into consideration other variables of interest that can explain the findings of this study. For instance, empathy and levels of femininity were reported as variables of interest in the association between sex and psychopathy (Jonason et al., 2013; Jonason & Davis, 2018), and could have some impact on altruistic behavior. It is important to notice that empathy was pointed out a factor that differentiates men and women in prosocial behaviors (Kamas & Preston, 2021). Thus, it would be relevant to test its role in this task.

Conclusion

Summing-up, in this study we explored the relation between psychopathic traits and altruistic behavior, considering the role of the participants' sex, using the Altruism-Antisocial task in an adult sample recruited from the community. Overall, results show that psychopathy, or its primary and secondary types, do not predict the measures of altruism in the experimental task. However, sex was found to moderate the relation between psychopathy and measures of altruism. The higher the psychopathic traits, the lesser the altruistic behaviors in men, reflected in lower costly helping, lower money left for the charity, and higher money kept by the participant. This pattern did not hold for women.

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