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ORIGINAL PAPER

Is there a nexus between pro-social behavior and well-being? Correlational evidence

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Abstract

Is there a connection between pro-social behavior and well-being? This question has long been of interest, with Aristotle famously suggesting a nexus between virtues and well-being. To delve into this relationship, I conducted an extensive study encompassing multiple classical economic games and nearly 100 well-being questions. My findings confirm that different patterns of pro-sociality are robustly correlated with each other. On top, I find reliable correlations between well-being and pro-social behavior, as well as certain forms of punishment. In terms of underlying explanations, I observe that pro-sociality is particularly associated with a form of long-term well-being known as *eudaimonia*, suggesting that pro-social behavior plays a fundamental role in people perceiving their life as meaningful.

Keywords Cooperation · Well-being · Happiness · Eudaimonia

JEL Classification C91 · D64 · D03

1 Introduction

Is there a nexus between pro-social behavior and well-being? According to Aristotle (1987), happiness stems from a virtuous life, with virtues attained through ethical conduct, such as being pro-social. Individuals seeking a happy and well-lived life strive to cultivate a pro-social character trait by repeatedly acting in accordance with it. This implies that pro-sociality is a *long-run cause* of well-being. Aristotle further argues that happiness, or *eudaimonia*, extends beyond a mere feeling and encompasses a set of character traits that are constitutive of a meaningful life.

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Once individuals have acquired these traits, they naturally tend to exhibit pro-social behavior. Thus, pro-sociality is also posited to be a *short-run effect* of well-being.

This study aims to shed light on the relationship between pro-social behavior and well-being. Drawing on Konow and Earley (2008), I conduct a comprehensive analysis wherein each participant answers an extensive well-being questionnaire and engages in multiple economic games that capture different forms of pro-sociality (and punishment). The questionnaire comprises almost 100 questions measuring both *long-run* and *short-run* well-being, including both *hedonic* (maximization of pleasure) and *eudaimonic* well-being (meaning in life). To examine pro-social behaviors such as *giving*, *trust*, and *cooperation* participants play two cooperation games: the dictator game and the sequential prisoner's dilemma. Additionally, three *punishment* games are employed to explore both *second-party* and *third-party* punishment. While my design offers correlational evidence that does not directly address the conjectured bi-directional causal *nexus* mentioned above, it does enable the investigation of how different patterns of behavior are interrelated (including their relationship with well-being). It also allows me to explore various explanations for the connection between well-being and pro-sociality by studying which types of behavior are associated with different forms of well-being.

I get three main findings. First, strong correlations between giving, trust, and cooperation suggest that these patterns make up a package of psychologically related traits. Moreover, these patterns are associated with impartial third-party but not with partial second-party punishment. Second, pro-sociality demonstrates a consistent connection to well-being. This correlation is most pronounced for (long-run) *eudaimonic* well-being and remains robust even when accounting for subjects' demographics, cognitive ability, material well-being, and the Big 5 personality traits. Evidence supporting the idea that short-run or long-run hedonic well-being drive behavior is relatively limited. Lastly, the observed distinction between second-party and third-party punishment extends to well-being, as only the latter exhibits a positive connection with eudaimonic well-being.

In my lab experiment, I establish a robust connection between well-being and pro-social behavior, with a particular focus on *eudaimonia*. My findings align with the literature on pro-social spending (see Curry et al., 2018 for a review), demonstrating that individuals derive emotional benefits from using their financial resources to assist others. This evidence has been obtained through diverse methods, ranging from cross-country evidence and longitudinal surveys (e.g., Dunn et al., 2008), experimental designs involving recall of past prosocial spending (e.g., Aknin et al., 2013; Aknin et al., 2020) or random assignment of participants to engage in pro-social spending or volunteering (e.g., Falk & Graeber, 2020; Dolan et al., 2021) to neuro-scientific investigations (e.g., Park et al., 2018). By generating a rich dataset encompassing various well-being measures and diverse behavioral patterns, my study contributes to this literature, allowing me to establish the significance of eudaimonic well-being and the link between pro-social behavior and third-party punishment in terms of behavior and well-being.

Most previous laboratory experimental studies have focused on a specific dimension of well-being, namely the easily manipulable *mood/short-run* (hedonic) well-being. Some studies treat mood as the dependent variable (Konow, 2010; Charness

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& Grosskopf, 2001; Becchetti & Antoni, 2010), while others manipulate it as an independent variable (Kirchsteiger et al., 2006; Ifcher & Zarghamee, 2011; Drouvelis & Grosskopf, 2016; Proto et al., 2019). Although these studies collectively provide compelling evidence that mood plays a significant role in certain contexts, they also highlight that mood does not provide a consistent explanation for all pro-sociality patterns: Kirchsteiger et al. (2006) e.g. demonstrate that a positive mood increases generosity in a gift-exchange game, but, interestingly, reciprocity is only enhanced by a negative mood. At least for second-party punishment, there is more consistent evidence that negative emotions play an important role (Hopfensitz and Reuben 2009; Bolle et al. 2014; Drouvelis and Grosskopf 2016). Interestingly, Brañas-Garza et al. (2014) identify two distinct sub-populations: fair and unfair punishers. It is conjectured that the former group plays a more significant role in the context of third-party punishment (Fehr and Fischbacher 2004; Crockett et al. 2013).[1]

The most closely related papers to my study are Konow and Earley (2008) (henceforth KE) and Espín et al. (2018). Espin et al. conduct a citywide representative survey experiment in Spain, focusing on the relationship between well-being, inequality, and inequality aversion using a dictator game and questions on eudaimonic well-being. In contrast, my paper focuses on various pro-social behavioral patterns. KE provide one of the few lab experimental papers that also considers *long-run* well-being. They establish the significance of eudaimonic well-being but limit their analysis to the specific case of dictator game giving, which has been shown to depend on the exact design and framing (Engel, 2011). However, it is important to note that my findings validate their conclusions, as they extend to a broader range of behavioral patterns. There is a clear association between certain forms of well-being and many pro-social and punishment behaviors.

2 Background and hypothesis

The economics of happiness has developed into a large and diversified field (see e.g., Clark, 2018). I will focus on what distinguishes *eudaimonic* (EWB) from *hedonic* (HWB) well-being (based on Ryan & Deci, 2001 and KE). The *hedonic school* (Kahneman, Diener, and Schwartz, 1999; Layard, 2005) follows a distinct empirical approach and focuses on well-being (WB) in the form of *happiness*—that is WB is defined in terms of the antagonism of pleasure versus pain. This implies that WB is regarded as an outcome variable that is typically assessed by people rating their WB by themselves, in accordance with their own standards.

The *eudaimonic school* (Ryff, 1989; Deci & Ryan, 1985) is more theoretical and follows Aristotle in defining WB not as a pleasurable feeling but in the form of *eudaimonia* ("human flourishing"), namely whether people live a meaningful life.

[1] Finally, Brandts and Rivas (2009) finds that stringent punishment institutions may increase well-being. Notably, my study is also related to the literature on the connection between patience and social behavior (see e.g., Curry et al., 2008; Espín et al., 2015; Espín et al., 2017.)

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A central requirement for this kind of life is that people respect the intrinsic ends of their activities, and, thereby, reach self-fulfillment. In modern times, "humanistic and positive psychology" have tried to define criteria for the fully functioning individual "living a life rich in purpose and meaning" (Ryff & Singer, 2008, p.1). Thus, EWB can be measured by psychological scales that define criteria based on the ideas outlined above and look to what extent people match these criteria.

In simple terms, the eudaimonic approach is about having a purpose in life, while the hedonic approach is about maximizing pleasure. But what is the potential relation of well-being to pro-sociality? Insights can be drawn from *Virtue Ethics* (see Bruni & Sugden, 2013), which, as the study of moral character, examines what virtues an ethical individual should embody. In this context, virtues are defined as *acquired* character traits or dispositions that are considered *constitutive* for "eudaimonia", the well-lived life. The underlying idea of eudaimonia is that individuals should approach "their various activities in ways that respect the intrinsic ends of [...] those activities" (Bruni & Sugden, 2013, p. 144), and virtues help individuals in attaining these ends. Can *pro-sociality*—for this study defined as behavior intended to directly benefit others—be considered such a virtue? Does it help to achieve the "internal end" of the situation in which it is displayed? My cooperation games, which involve monetary exchanges, capture human *economic* interaction where achieving *mutual benefits* can be seen as a natural "internal end" (Bruni & Sugden, 2008, 2013). While egoists instrumentally use interactions to maximize their "external goal" of payoff, pro-social individuals strive to "interact well", accomplish reciprocal benefits, and, thereby, follow the activity's "internal goal", fostering genuine fulfillment.

As indicated before and following KE (p. 8), these considerations suggest a bi-directional causality: Initially, individuals driven by the aspiration to live a well-lived life strive to acquire a pro-social character trait by *repeatedly behaving in accordance with that trait*, leading to higher EWB in the *long-run*. Here, eudaimonists treat EWB as a set of personality characteristics constitutive of a meaningful life, rather than a mere subjective feeling. Once individuals have, however, *acquired this trait*, they are intrinsically motivated to engage in pro-social behavior. Hence, in the *short-run*, higher EWB, reflective of the acquired character traits, leads to a higher likelihood of exhibiting pro-sociality. Consequently, pro-sociality is both a *long-run cause* and a *short-run effect* of *eudaimonic* WB. In addition, *hedonic* WB, associated with pleasure, emerges as a favorable by-product of acting with intrinsic motivation, i.e., of EWB. Given that my design will only allow me to establish correlational evidence, I anticipate the following outcome:

> ***EWB Hypothesis***: There is a strong correlation between eudaimonic WB and pro-social behavior. Long-run hedonic WB is strongly correlated with eudaimonic WB but shows a weaker correlation to behavior. Different patterns of pro-social behavior are robustly related to each other.

Of course, alternative hypotheses are conceivable and I will control for them accordingly. For instance, long-run hedonic WB might be more influential than eudaimonic WB, or mood may play a more substantial role. This could include the possibility of being in a good mood at the start of the experiment being correlated with pro-social

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behavior, or pro-social behavior potentially enhancing subjects' mood/short-run hedonic WB. Furthermore, third factors such as higher material WB or greater cognitive ability may be associated with pro-social behavior.

Finally, the relationship between punishment and pro-social behavior remains an open question. While punishment may not directly benefit others but rather harm them, it can be motivated by the desire to enforce cooperation norms for the benefit of everyone. Putting it differently, whether any observed association between prosociality and well-being translates to punishment may hinge on individuals' motivations to punish. 'Fair' punishment, driven by the motive to enforce cooperative norms, aligns with the "internal end" of an interaction that seeks mutually beneficial outcomes. In contrast, 'unfair' punishment, characterized by retaliatory motives, solely aims to harm others. Considering the potential distinctions in motives between second-party (SP) and third-party (TP) punishment, differences in their relationships with well-being are expected to emerge.

3 Experimental design

Well-being questionnaire: At the outset of the experiment, participants complete a comprehensive well-being (WB) questionnaire, which is a slightly modified version of KE. The questionnaire includes 13 different WB scales and nearly 100 questions. However, considering the potential issue of multiple testing that arises from combining these questions with the five different games and to facilitate clarity in the analysis, I will aggregate the scales into the three main categories presented below. Ultimately, I am interested in which WB category is related to pro-sociality and not which individual scale.

The aggregate measure of *long-run hedonic WB* comprises two different scales: an *Overall Happiness* question ("Overall, how would you describe yourself") measures the so-called *cognitive-evaluative* component of HWB. The 20-item *Positive and Negative Affect Schedule* by Watson et al. (1988) measures the so-called *affective* component, asking subjects what feelings they have experienced during the "past few weeks". All scales and underlying questions can be found in online Appendix D. To calculate *aggregate* measures, I generally follow the approach of Kling et al. (2007). Each aggregate measure is an equally weighted average of the z-scores of its components. Equal weight is given to the *cognitive–evaluative* and the *affective* component of HWB.

As an often-used concept, many different scales have been developed for HWB, allowing for a first robustness check. In addition to the two scales mentioned above, I also included two questions regarding the *"highest"* and *"lowest"* happiness subjects have experienced in the long run. Additionally, I asked subjects for their *Satisfaction With Life* (Diener, Emmons, Larsen, and Griffin, 1985) consisting of five items. Strictly speaking, this measure is neither about maximizing pleasure nor feeling purpose but about life satisfaction and is often used by economists. Due to larger conceptual differences, I opted not to include these three measures in the aggregate score but I will control form them in the analysis.

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Table 1 Summary of games

Games	Measure for.	Label	Order
Dictator game	Giving, altruism	DG	1/2
Seq. prisoner's dilemma	Trust and cooperation	SPD	1/2
Mini-ultimatum game	Second-party punishment	Mini-UG	3
SPD with punishment	(Low-cost) third-party punishment	SPD-P	4
DG with punishment	(High-cost) third-party punishment	DG-P	5

Short-run hedonic WB is measured by four instruments: A single *Now Happiness* question ("Right now, how would you describe yourself") and the seven-item *Mood Index* by Batson et al. (1988) are used to calculated an *aggregate* short-run HWB measure. Both instruments were administered at the very beginning, after the first, and after the second game. By subtracting the score at a later point from the score obtained at an earlier point, the *Now Happiness Change* and *Mood Index Change* can be computed. These two variables are then used to determine the aggregate *change* in short-run HWB after a behavioral choice(s) in the dictator game and the seq. prisoner's dilemma, the first two games in the study. Notably, this change can not be calculated for the punishment games, as it was not desirable to administer these questions too frequently.

Eudaimonic WB is measured by three more extensive psychological scales. Consistent with KE, the study uses the 15-item *Self-Actualization Index* by Jones and Crandall (1986) and the 18-item *Scales of Psychological Well-Being* by Ryff (1989). As KE's measures of EWB mainly focus on psychological functioning or the personal experience of living a purposeful life, an additional scale, the 15-item *Social Well-Being* scale by Keyes (1998), assesses individuals' flourishing within a societal context. For my study, it is essential that these three measures do not directly evaluate the perception of life as meaningful through questions about pro-social behavior. Although this is generally not the case, potential issues may arise with specific questions. Online Appendix B.1 outlines that results are robust to excluding these questions.[2]

The last part of the questionnaire is the *Marlowe-Crowne social desirability scale*. In the concluding questionnaire, subjects had to answer demographic questions (including items about income and expenditures). Additionally, the *Cognitive Reflection Test* introduced by Frederick (2005) was included. It tries to indirectly measure cognitive ability by distinguishing quick, impulsive decision-makers from more reflective ones. Moreover, risk preferences were elicited following Holt and Laury (2002). A ten-item variant of the Big Five Inventory was asked.

Experimental Games and procedures: Following the completion of the questionnaire, participants engaged in five different games (see Table 1), with the first

[2] In aggregating, all three EWB components are given equal weight although giving equal weight both to the *personal* and the *social* component would lead to very similar results.

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two games focusing on measuring pro-sociality, which is the main focus of this study, and randomized in order. Due to their popularity, I will only briefly describe the purpose of each game, reserving a detailed description for online Appendix B.1. In the dictator game (DG), one player (the dictator) determines how to divide a pie, shedding light on individual tendencies toward giving. In the sequential prisoner's dilemma (SPD) or bilateral trust game, one player (the trustor) can transfer a portion of their initial endowment to another player (the trustee or cooperator), expecting a multiplied amount in return, thus capturing trust and cooperation. The remaining three games examine second-party and third-party punishment. In the mini-ultimatum game (Mini-UG), the proposer decides whether to make a fair or unfair offer to the responder, indicating an equal or unequal distribution of money, respectively. I interpret the responder's rejection of an unequal offer, leading to a zero payoff for both players, as an instance of second-party punishment. The SPD with punishment (SPD-P) and DG with punishment (DG-P) games modify their base versions and introduce opportunities for a third, uninvolved party to punish unfair behavior. This act of punishment can entail either high or low costs, with investing one point resulting in a payoff reduction of one (three) point(s) for the punished individual in DG-P (SPD-P), respectively.

Each of the five games was presented in a separate section and feedback was withheld until the end of the experiment to avoid confounding effects. To gather more data, subjects were asked to make decisions for all roles, including first, second, and third mover ("role reversal"). When a role involved decisions at multiple decision nodes, the strategy-elicitation method was used to obtain choices for all nodes. For payment, one of the games was randomly selected and roles in the selected game were also randomly determined. Apart from 6 EUR for completing the WB questionnaire, participants' payment was the sum of the selected game earnings and their lottery choice. The average earnings were 24€ and the sessions lasted about 90 min. The experiments were conducted at the University of Mannheim in seven sessions, each with 8 to 18 subjects. Expecting smaller effects due to a single-blind procedure in contrast to KE, power calculations suggested doubling KE's number of independent observations: 102 subjects, each representing one independent observation, participated. I recruited participants using ORSEE (Greiner, 2004), and the experimental software was implemented in z-Tree.

4 Results and analysis

Online Appendix B.1 demonstrates that the results obtained from the games and the WB questionnaire replicate those found in the literature, supporting some of the design choices outlined earlier. The instruments work fine and the data can be analyzed on this basis.

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Table 2 Correlations between behaviors

	Giving	Trust	Coop	SP-pun	lc TP-pun	hc TP-pun
Giving	1.00					
Trust	0.35	1.00				
	0.001					
Cooperation	0.41	0.62	1.00			
	0.000	**0.000**				
SP-punishment	−0.09	−0.01	−0.08	1.00		
	0.445	0.866	0.480			
Low-cost TP-Punishment	0.34	0.20	0.21	0.19	1.00	
	0.000	0.055	**0.033**	0.066		
high-cost TP-Punishment	0.31	0.14	0.19	0.19	0.62	1.00
	0.001	0.106	**0.046**	**0.021**	**0.000**	

p-values below 5% are in bold type. Ordinal variables: Giving, Cooperation, TP-Punishment; Dichotomous variables: Trust, SP-punishment. Spearman's ρ for two ordinally scaled variables. Pearson's correlation for two dichotomous variables. Rank biserial correlation for one ordinal and one dichotomous variable, n=102

4.1 Correlation between behaviors

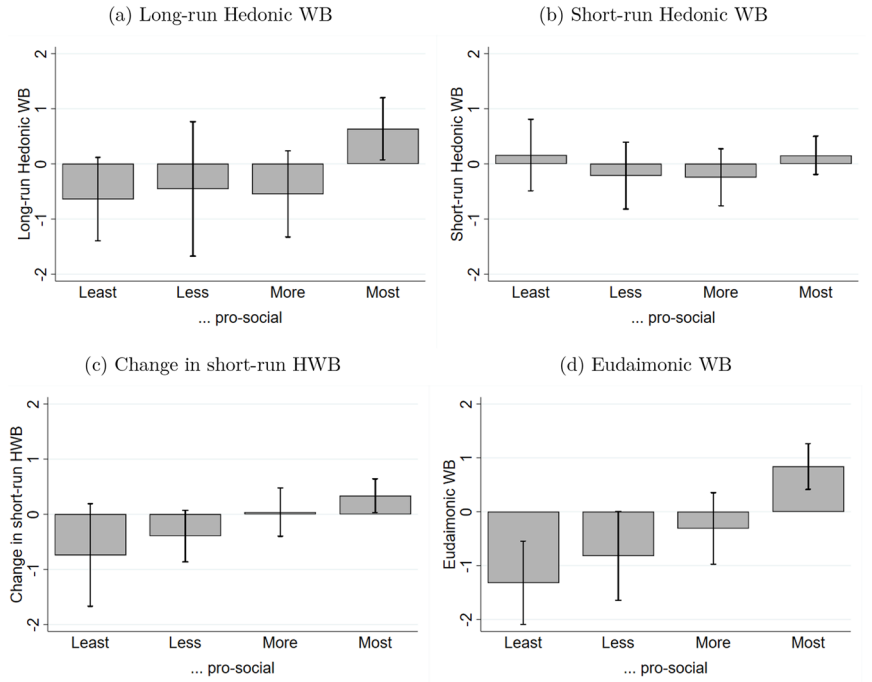
Table 2 shows how decisions in the experiment correlate with each other. Giving, trusting, and cooperation are strongly linked. For punishment, both types of TP-punishment (low vs. high cost) correlate highly, while the correlation with SP-punishment is less strong. A potential interpretation is that both forms of punishment may share the motivation of 'fair' norm-enforcement but not the one of 'unfair' retaliation. Interestingly, pro-social behavior is in turn related to impartial TP-punishment but not to partial SP-punishment.

Result 1. Giving, trusting, and cooperating are psychologically related traits. They are related to impartial TP-punishment but not to partial SP-punishment.

4.2 Pro-social behavior and WB

The *E*WB Hypothesis entails that individuals who more frequently engage in pro-social behavior should experience higher levels of eudaimonic well-being (WB). To streamline the analysis and mitigate the issues of multiple testing, I will aggregate the data in two stages for certain parts of the study. First, I will focus on WB categories instead of individual scales. Second, I will create a *pro-sociality index* by combining giving, trust, and cooperation, as these factors share close psychological associations. Specifically, participants who exhibit pro-social behavior in all three decisions will be classified as *most pro-social* (46% of subjects), in two decisions as *more pro-social* (25%), in one decision as *less pro-social* (15%), and those exhibiting pro-social behavior in none of the decisions will be classified as *least pro-social* (14%). A histogram of the *pro-sociality index* is presented in

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Notes: Those behaving pro-socially in all three (two/one/none) cooperation game decisions (giver, trustor, cooperator) are classified as most (more/less/least) pro-social. Figures include 95% confidence intervals.

Fig. 1 Well-being measures and pro-sociality Index

Figure A1 (online Appendix). To address any remaining concerns regarding multiple testing, I will employ the step-up procedure developed by Hochberg (1988), unless otherwise stated.

Figure 1 displays participants' well-being scores across the main aggregated WB categories (a–d) and different levels of pro-sociality. As the WB categories are based on standardized components, the average WB is zero. For detailed mean values and two-tailed p-values of non-parametric Jonckheere's trend tests (Jonckheere, 1954), refer to Table A1 in the online Appendix. Consistent with the *E*WB Hypothesis, Fig. 1d demonstrates a distinct increase in eudaimonic well-being (adj. $p = 0.002$) as pro-sociality levels rise. Similarly, although to a lesser extent, Fig. 1a indicates a similar effect for long-run hedonic WB (adj. $p = 0.074$), and Fig. 1c for short-run hedonic WB after the games (adj. $p = 0.074$). The data suggests that the more frequently individuals engage in pro-social behavior, the more their mood improves. Conversely, no significant correlation (adj. $p = 0.495$) is observed between short-run hedonic WB or initial mood in Fig. 1b, implying that a positive mood does not lead to pro-social behavior. In the online Appendix, Table A2 provides a breakdown of the four WB categories and supports the notion that eudaimonic well-being is more strongly associated with pro-sociality

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Table 3 (Ordered) Logit regressions for dictator game and seq. prisoner's dilemma with demographic controls

	(1) **Pro-socialty Index**	(2) Giver dummy	(3) Trustor dummy	(4) Coop. dummy
Long-run HWB	**−0.035**	−0.089	0.347^{+}	−0.189
	(0.116)	(0.124)	(0.150)	(0.145)
Short-run HWB	**0.019**	0.107	−0.478^{+}	0.339
	(0.173)	(0.176)	(0.204)	(0.213)
Change in short-run HWB	**0.362****	0.217	−0.123	0.600*
	(0.137)	(0.176)	(0.204)	(0.213)
EWB	**0.356****	0.422*	0.473*	0.611**
	(0.134)	(0.153)	(0.204)	(0.185)
Expenditures	**0.001**	0.002	0.000	−0.001
	(0.001)	(0.001)	(0.001)	(0.001)
Parents' Income	**0.189**	0.260	0.060	0.085
	(0.183)	(0.224)	(0.226)	(0.202)
Cognitive Ability (CRT)	**0.139**	0.756	−1.195	0.303
	(0.448)	(0.612)	(0.712)	(0.796)
Additional controls (& Cons.)	✓	✓	✓	✓
N	**102**	102	102	102
Pseudo R^2	**0.133**	0.217	0.400	0.309

Notes: Ordered logit regression in (1). Logit regressions in (2)–(4). Robust standard errors in parentheses; $^{+}$/*/** indicates significance at the 10%/5%/1% level. In specifications (2)–(4), *p*-values are adjusted (Hochberg 1988) to account for the multiple testing implied by looking at decisions separately. WB measures are aggregated. Additional control variables are listed in footnote 5

compared to other measures of well-being, primarily influenced by two specific measures (SAI and SoWB).[3]

To conduct a more detailed analysis and disaggregate the data based on the three choices, I employed (ordered) logit regressions, as presented in Table 3. In these regressions, different WB categories compete in explaining pro-sociality. In the main specification (1), the dependent variable is the *pro-sociality index*, which ranges from 0 to 3. Specifications (2)–(4) break down the data for the three individual decisions (*Giver, Trustor*, or *Cooperator*), and the corresponding *p*-values are adjusted for multiple testing.[4] All regressions control for material WB and cognitive ability and include —unlike KE— demographic controls.[5]

[3] In addition, online Appendix B.3 (Table B7a and B7b) provides a completely disaggregated analysis, both in terms of behavior and WB measures. Interestingly, in addition to the measures previously discussed, positive (but not negative) affect appears to have some predictive power in explaining behavior.

[4] Online Appendix B.2 investigates the robustness of the analysis and finds support.

[5] More precisely, I include the MC scale, a dummy for the sequence of games, and the subjects' level of confidence in truthfully answering questions. In addition, those conceptually different measures (*SWL HH*, *LH*) that do not enter the aggregate long-run HWB serve as a control. Moreover, regressions control for age, sex, health, nationality, and the students' subject. Finally, regressions for trust also include risk preferences and people's expectations about what others return in the SPD.

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The main specification (1) reveals three findings. First, it confirms the significant positive correlation between EWB and pro-sociality that was observed in Fig. 1. Second, even after controlling for demographics and other factors, the association between engaging in pro-social behavior and an increase in short-run HWB/mood remains significant. Lastly, the regression analysis does not support the notion that long-run HWB is linked to pro-sociality, as the coefficient is negative. Additional evidence supporting the importance of EWB can be found in online Appendix A, which presents an additional "mediation" analysis.

The results pertaining to the three separate decisions also provide valuable insights. EWB demonstrates significance for all three dummies: Giver, Trustor, and Cooperator. However, the finding that pro-social behavior appears to increase subjects' mood only holds for cooperating in the seq. prisoner's dilemma, whereas a negative, albeit insignificant, coefficient is observed for trusting. In addition, specifications (2)–(4) indicate that long-run HWB is, at best, only associated with trusting (adj. $p = 0.063$), consistent with the overall weakness of this relationship. Omitted variables that have predictive power in explaining behavior in some decisions include sex as well as age and, for trusting, the belief of whether others are trustworthy.[6]

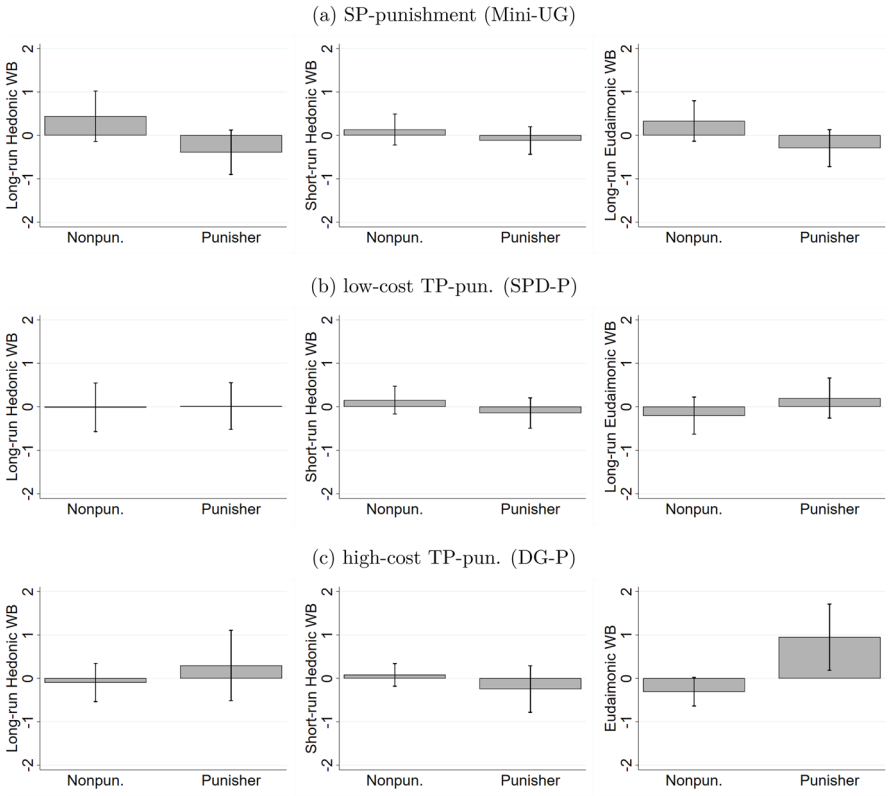
To gain a better understanding of the impact of EWB on pro-sociality, one can calculate the odds ratio for the four different specifications: (1) 1.42, (2) 1.52, (3) 1.60, and (4) 1.84. For instance, a one-unit increase in the aggregate EWB measure, which corresponds to roughly 40% of the standard deviation, results in a 42% increase in the odds of engaging in pro-social behavior, clearly a non-negligible effect. Finally, online Appendix B.2 reveals that the findings are robust for controlling for the Big Five Inventory, at least in the case of EWB. Thus, a strong correlation between eudaimonic WB and pro-sociality persists, even when considering personality traits.

As a final analysis, I divide the subjects based on the median scores for different WB categories and examine whether those scoring at or above the median have a higher likelihood of being classified as 'most pro-social' compared to those scoring below the median. I observe an effect for all four well-being measures, with the strongest relationship once again appearing for EWB. Being at or above the median increases the likelihood of being classified as 'most pro-social' from 33 to 59% (refer to Table A4 in the online Appendix). Thus, our results consistently indicate that the strongest and most robust correlation between pro-social behavior and WB is found in eudaimonic WB, as observed in both aggregated and disaggregated analyses. Long-run HWB is associated with EWB (see online Appendix B.1), but it seems to be linked specifically to trusting and not pro-sociality in general. Furthermore, I find no evidence supporting the idea that a positive mood leads to pro-social behavior. However, there is some indication that pro-sociality improves one's mood, albeit only under certain patterns of pro-social behavior. Overall:

Result 2. WB and pro-social behavior are correlated. The data is strongest and most consistent with the *EWB* Hypothesis

[6] Online Appendix B.2 further explores the robustness of these findings and supports the results obtained in the main analysis.

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Notes: Figures include 95% confidence intervals.

Fig. 2 Well-being measures and punishment

In conclusion, my analysis, which includes controlling for multiple testing, demographics, and Big 5 personality traits, further strengthens the central finding of KE and demonstrates its applicability to pro-social behavior in a broader context.

5 Second-party (SP) vs. third-party (TP) punishment

This section focuses on examining the distinction between SP- and TP-punishment. Figure 2 presents the main well-being measures categorized by punishment games (a–c) and individuals who choose to punish or refrain from punishing (Table A6 provides the corresponding mean values and tests). The figure shows long-run hedonic WB on the left, short-run hedonic WB in the middle, and eudaimonic WB on the right. At the top, I find no substantial or significant difference between individuals engaging in SP-punishment and those who do not. If anything, there appears to be a negative relationship, where punishers tend to score lower in WB measures compared to non-punishers. On the other hand, below, TP-punishment generally exhibits a positive association with long-run hedonic or eudaimonic WB, albeit these differences are

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typically small and statistically insignificant. However, a notable disparity in WB between punishers and non-punishers emerges for high-cost TP-punishment and eudaimonic WB (adj. $p < 0.024$), similar to the results observed for pro-social behavior (supported by a regression analysis presented in Table A5 in the Appendix).

Result 3: I identify a tentative distinction between SP-punishment and (costly) TP-punishment, aligning with the notion that the latter is more pro-social in nature, while the former leans more toward retaliatory behavior.

6 Conclusion

Are pro-sociality and well-being connected? My study reveals a reliable relation between different patterns of pro-social behavior (as well as 'fair' punishment) and long-run well-being. At least, in case we think about well-being not just in terms of pleasure, but in terms of a "meaning in life". This study was motivated by alluding to the idea that pro-sociality could be both a long-run cause and a short-run effect of happiness. Although my results do not directly address this conjectured causal *nexus*, they certainly do not contradict it. While manipulating long-term well-being, especially eudaimonic well-being, is challenging, it is desirable for future research to explore these proposed causal pathways through longitudinal intervention studies.

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Data availability The replication and supplementary material for the study is available at: https://doi.org/10.17605/OSF.IO/BM7RA.

Declarations

Conflict of interest The authors declare that they have no conflict of interest.

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