



# Explaining Prosocial Behavior from the Inter-and Within-Individual Perspectives: A Role of Positive Orientation and Positive Affect

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## Abstract

Prosocial behavior is undertaken voluntarily to benefit others and includes a range of actions, such as helping, sharing, caring, and comforting. Our study concerned psychological mechanisms stimulating prosocial behavior explaining it from both the within-individual (daily fluctuations) and inter-individual (individual differences) perspectives. We tested a model in which positive orientation and positive affect directly predict within-individual variability in prosocial behavior and in which positive affect mediates the relationship between positive orientation and daily prosocial behavior. These two-level mediation mechanisms were investigated using an intensive longitudinal study design with seven daily measurements on a sample of 181 undergraduates and 1119 daily observations. The results confirm that, with personality traits, sex, and prosocial behavior during the previous day adjusted for, inter- and within-individual variability in positive orientation predict daily prosocial behavior. Inter-individual variability in positive affect is a significant predictor of prosocial behavior and a mediator between positive orientation and daily prosocial behavior. No such mediation mechanism was detected for within-individual variability in positive affect. These results suggest several recommendations on how to stimulate prosocial behavior. By stimulating the general tendency to cultivate positive affective experiences and to view life in a positive light, it may be possible to prepare people to notice and respond to the needs of others.

**Keywords** Prosocial behavior · Positive orientation · Affect · Within-individual variability · Inter-individual differences · Multilevel analysis

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## 1 Introduction

Prosocial behavior is undertaken voluntarily to benefit others and includes a range of actions, such as helping, sharing, caring, and comforting (Caprara et al., 2012a, 2012b; Eisenberg et al., 2007). Engaging in such actions is of obvious importance, as they increase the quality of interactions between individuals and groups (Eisenberg et al., 2007) and are beneficial for the whole society (Meier, 2007). The better understanding of mechanisms stimulating prosocial behavior is especially important nowadays, as there are generational shifts showing an increase in self-interest and a decrease in concern for others, manifesting itself, for instance, in empathy for outgroups, charity donations, and importance attached to having a job that is useful to society (Twenge et al., 2012). Therefore, our study attempts to explain psychological mechanisms stimulating prosocial behavior.

The present study adds the within-individual perspective (e.g., Cervone, 2005) to investigations of prosocial behavior, seeking to explain prosocial behavior within one person over time, in addition to analyzing inter-individual differences in behavioral tendencies. As research showed that explanations coming from different levels of analysis do not necessarily correspond (e.g., Bolger & Laurenceau, 2013; Kozlowski & Klein, 2000) and inter-individual level relationships between variables cannot be extended to the within-individual level (Cervone, 2005), multilevel analyses may shed a new light on psychological mechanisms pertaining to prosocial behavior. We expand the existing evidence, coming from experimental and correlational studies based on inter-individual assessments, by providing new evidence showing that this behavioral phenomenon exhibits significant daily within-individual variability. As a result, inter-individual explanations are supplemented by within-individual findings. We also propose that, in terms of within-individual variability, personal resources in the form of daily affect and daily positive beliefs are antecedents to prosocial behavior, in addition to inter-individual variability of affect and positive beliefs. We tested the dynamic mechanisms linking personal resources and prosocial behavior using an intensive longitudinal study design (Bolger & Laurenceau, 2013) with daily measurement of variables.

### 1.1 The Between- and Within-Individual Perspectives in Explaining Prosocial Behavior

As effective prosocial behavior involves self-regulation and requires effort, emphasis needs to be placed on the assets that enable a person to engage in activities. From the perspective of personal resources, individuals can build their performance on the basis of their psychosocial resources (Hobfoll, 2002). People employ their resources, which are considered key for effective adaptation, in order to conduct their social relations and behavior, preventing and extending their resource reservoir. As indicated in past research, special attention needs to be paid to positive psychological factors such as positive beliefs and affect (Carver, 2006; Laguna, et al., 2017). The positive side of human functioning still needs adequate recognition as a resource reservoir. Based on the current state of research, it is legitimate to conclude that personal resources are motivational and lead to engagement in action (e.g., Salanova et al., 2011), including prosocial behavior (Eisenberg et al., 2007). In order to prevent resource loss and to enhance motivating resource gain spirals, people need to invest their resources, and those with greater personal resources are more capable to do so (Hobfoll, 2002). Thus, the more resourceful people may be more ready to engage in prosocial actions, which in turn, may bring them more resources, such as for example

gratitude, reciprocal acts of kindness, and higher social status. Therefore, in this study we focus on two personal resources, namely positive affect (PA; Fredrickson, 2001) and positive orientation (POS; Caprara et al., 2009).

Despite the growing body of research on personal resources and positive psychological factors, this appears to be a fairly unexplored area (Moore et al., 2018). Knowledge about the relationships between affect, beliefs, and prosocial behavior has been mostly obtained at the inter-individual level of analysis and therefore cannot automatically be extrapolated to other levels (e.g., to groups at a higher level or to a person's transient experiences at a lower level). Analyses performed at the inter-individual level concentrate on the relative stability of constructs (i.e., differences between people), while analyses at the within-individual level concentrate on the variability of constructs (i.e., within-individual variability), which may change across objects (e.g., personal goals; Laguna, et al., 2017), across situations, or over time. Multiple measurement times (e.g., daily) allow to disentangle the specific within-individual variability of each construct and the inter-individual variability, or individual differences (Bolger & Laurenceau, 2013), and to answer different research questions referring to each level. At the inter-individual level, the issue is the relationship between people's characteristic levels of the variables in question: the issue is whether people who are characteristically higher in PA and POS behave more prosocially on a specific day. In this case, we predict daily prosocial behavior based on inter-individual differences. At the within-individual level, in contrast, the issue is the relations of a person's daily levels of PA and POS to daily prosocial behavior: whether a person who experiences PA and positive beliefs on a particular day engages in prosocial behavior during that day. Due to the different nature of analysis at each level, explanations pertaining to the inter-individual differences level cannot be extended to the within-individual level (Cervone, 2005). It is thus quite usual that the nomological networks of constructs are different at the inter- and within-individual levels (Bolger & Laurenceau, 2013) and thus it is worth testing these relationships at different levels, even if previous findings do not suggest different hypotheses for each level.

## 1.2 Positive Orientation and Prosocial Behavior

Engagement in prosocial behavior is likely to be related to the beliefs a person holds. As many studies have demonstrated, holding positive beliefs about oneself (self-esteem), one's life (life satisfaction), and the future (optimism) is associated with prosocial behavior (e.g., Baumsteiger, 2017; Fu et al., 2017; Moynihan et al., 2015; Zhang & Zhao, 2021). It has been found that all these three beliefs reflect a general tendency to approach reality in a positive way, being components of an underlying cognitive orientation (POS), also called positivity. POS and its components are positively related to prosocial behavior (Eisenberg et al., 2007; Thoits & Hewitt, 2001). As explained by Caprara et al., (2019, p. 129), POS "promotes a virtuous set of interactions with the environment, in which positive appraisals of events set the premises for rewarding experiences." Thus POS is considered as a cluster of positive beliefs which help a person to approach reality in a positive way and stimulate positive interactions with others (Caprara et al., 2019). Indeed, children higher in POS tend to become more prosocial over time (Luengo Kanacri et al., 2017), and POS assessed during adolescence predicts positive interpersonal relational styles in young adulthood (Castellani et al., 2016).

Both theory and previous research refer to POS as a relatively stable trait-like disposition, a pervasive mode of appraising oneself and experience (Caprara et al., 2009).

However, as Caprara et al. (2019) stated in a their review, while heredity accounts for a substantial proportion of POS, the contribution of experience is no less important for its manifestations. Future research should therefore be “more focused on the life events and circumstances and on the factors that introduce variability in positivity rather than on its stability” (Caprara et al., 2019, p. 131). The idea that POS can also be treated as a state-like phenomena, which is changeable within a person, was developed further by Laguna (2019) and is supported by empirical evidence from longitudinal studies (Alessandri et al., 2014). We wanted to look at how both inter- and within-individual variability of POS is related to daily within-individual prosocial behavior, postulating positive relationships at both levels.

**Hypothesis 1<sub>a</sub>** Inter-individual variability of POS is positively associated with daily prosocial behavior.

**Hypothesis 1<sub>b</sub>** Within-individual variability of POS is positively associated with daily prosocial behavior.

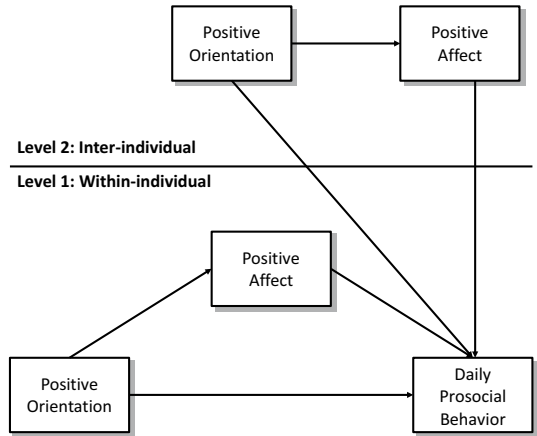
### 1.3 Affect and Prosocial Behavior

Affect—consciously accessible feelings, evident in moods and emotions—is an important motivational factor that not only results from goal realization and social relations but also stimulates individual behavior (Carver, 2005, 2006; Moore et al., 2018; Plemmons & Weiss, 2013). It is documented that this motivational factor systematically predicts behavioral choices, intensity, and persistence in action (Seo et al., 2010), including prosocial actions (e.g., Aknin et al., 2018; Eisenberg et al., 2007).

Especially PA is recognized as a driver for prosocial behavior, by increasing the likelihood of adaptive behaviors, such as sociability (Diener et al., 2015). Both experimental studies manipulating PA and longitudinal studies support the association between PA and prosocial behavior (for a review, see Moore et al., 2018). PA impacts prosocial behavior by influencing behavior-related judgments and appraisals by making affect-congruent information highly accessible (i.e., prosocial concepts associated with PA due to socialization and education) and by influencing behavioral performance in compliance with a hedonic motive, namely orientation towards the maximization and maintenance of PA (i.e., prosocial behavior allows for the maintenance of PA; Gendolla, 2000). Moreover, PA broadens the scope of attention and the available action repertoires (Fredrickson, 2001), providing opportunities for people’s attention to turn to the needs of others and to finding ways of satisfying these needs.

However, although affect is considered highly variable within a person over time, most of the existing theorizing and evidence refers to between-person differences. We expected that both, inter- and within-individual variability of PA would show their motivational effect in stimulating daily prosocial behavior. As Moore et al. (2018) stated when summarizing their review of literature, there are not only individual differences manifested in high trait levels of PA that lead to sociability; within-individual variability manifested in high state levels of PA may stimulate prosocial behavior too. Their predictive power, however, may be different. For example, George (1991) found that positive mood (changeable state of PA) was linked to helpful behaviors on the job, while inter-individual trait PA was not correlated with those behaviors. At the within-individual level, previous studies have shown that helping others is positively related to within-individual PA (Glomb et al., 2011), reinforcing each other in daily life (Snippe et al., 2018). Further analysis of these

**Fig. 1** The hypothesized mediation model



relationships at the inter- and within-individual levels is needed to disentangle their role at each level.

**Hypothesis 2<sub>a</sub>** Inter-individual variability of PA is positively associated with daily prosocial behavior.

**Hypothesis 2<sub>b</sub>** Within-individual variability of PA is positively associated with daily prosocial behavior.

### 1.4 Mediation Mechanisms

As explained above, we tested the role of personal resources, namely inter- and within-individual variability of POS and PA, in predicting daily prosocial behavior. Thanks to employing an intensive longitudinal study design (Bolger & Laurenceau, 2013) with seven measurement times, we were able to distinguish the inter- and within-individual variability of each construct and analyze the dynamic relations between them.

Moreover, as postulated in the beliefs-affect-engagement model (Laguna, 2019), we expected that both inter- and within-individual variability of PA would serve as mediator between POS and daily prosocial behavior. These expectations are based on evidence from longitudinal studies showing that POS predicts PA rather than vice versa over years and days (Alessandri et al., 2014).

**Hypothesis 3<sub>a</sub>** Inter-individual variability of PA mediates the relationship of inter-individual variability of POS to daily prosocial behavior.

**Hypothesis 3<sub>b</sub>** Within-individual variability of PA mediates the relationship of within-individual variability of POS to daily prosocial behavior.

Our model is represented in Fig. 1.

To provide more robust explanations of prosocial behavior, we controlled for several variables. First, we adjusted for the prosocial behavior at a previous time point (i.e., the day before). Second, taking into account the ongoing discussion concerning a role of gender

in prosocial behavior (Espinosa & Kovářik, 2015; Kamas & Preston, 2021), we adjusted for sex. Finally, we adjusted for personality traits, as according to recent meta-analysis they account for prosocial behavior (Thielmann et al., 2020). As this meta-analysis demonstrates, people with certain personality traits (e.g., agreeableness) are willing to benefit others even at personal cost while others are not, therefore to provide unconfused evidence it is worth to control for personality traits when looking for the role of other inter- and intra-individual variables.

## 2 Method

### 2.1 Participants

The participants in the daily diary study were 181 undergraduates (71.0% females) from Poland, who studied different majors (41.5% were psychology students). Their mean age was 21.61 ( $SD = 1.67$ ).

The sample of 181 students filled in the initial on-line questionnaire, and subsequently they completed seven daily surveys. Only data from those who completed three or more daily surveys were used in the analyses ( $M = 6.18$  daily measures,  $SD = 1.20$ ). The average daily analyzed sample size was 159.9 ( $SD = 9.9$ ), and daily questionnaires were completed by 168 (92.8% of the total sample), 170 (93.9%), 171 (94.5%), 153 (84.5%), 158 (87.3%), 153 (84.5%), and 146 (80.7%) participants on consecutive days. In total, they provided 1,119 daily measures.

### 2.2 Procedure

Participants were invited to take part in the study during university classes, via social media and announcements on the university website. After providing their email addresses they were directed to the initial on-line questionnaire, which included a description of the study, an electronic consent form, and a measure concerning personality traits. Participation in the study was voluntary.

Next week after signing up and completing the initial questionnaire, the participants were asked to complete a daily survey each day for a week (starting on Monday and ending on Sunday). Links to the surveys were emailed daily, and the participants were instructed to complete them each evening. In this way, we wanted to ensure that they did not complete multiple surveys at once.

### 2.3 Measures

To measure the study variables on seven consecutive days, we used three instruments with instructions adapted to capture daily experiences.

**Daily prosocial behavior** was measured with 5 items of the Prosocialness Scale (Caprara et al., 2005), capturing daily caring, sharing, and helping behaviors (e.g., “I try to console those who are sad”). Each day the participants were asked to mark the answer that reflected their behavior during a specific day on a 5-point scale (1 = *never/almost never* to

5 = *almost always/always*). Cronbach's  $\alpha$  for the seven days ranged from 0.87 to 0.93 (0.87, 0.89, 0.91, 0.88, 0.92, 0.92, and 0.93 for consecutive days).

**Daily POS** was measured with the Positivity Scale (Caprara, et al., 2012a, 2012b). The measure consists of eight items, which the participants answered on a 5-point scale (1 = *strongly disagree* to 5 = *strongly agree*) thinking about a particular day (e.g., "Today, I felt I had many things to be proud of"). Cronbach's  $\alpha$  for the seven days ranged from 0.82 to 0.92 (0.91, 0.91, 0.82, 0.88, 0.90, 0.92, and 0.92 for consecutive days).

**Daily PA** was measured with 10 adjectives (e.g., "Excited") of the Positive and Negative Affect Schedule (Watson et al., 1988). The participants were asked to indicate to what extent they had felt this way during a particular day using a 5-point scale (1 = *very slightly* to 5 = *extremely*). Cronbach's  $\alpha$  for the seven days ranged from 0.92 to 0.94 (0.93, 0.92, 0.94, 0.94, 0.93, 0.94, and 0.94 for consecutive days).

**Personality traits** were measured during the completion of the initial questionnaire, before daily surveys. We used the Big Five Questionnaire (Caprara et al., 1993), consisting of 24 items for each of five scales: Agreeableness (called also Friendliness; example item: "I hold that there's something good in everyone"), Extraversion (called also Energy; example item: "I am an active and vigorous person"), Conscientiousness (e.g., "I always pursue the decisions I've made through to the end"), Emotional Stability (e.g., "Usually I don't lose my calm"), and Openness to Experience (e.g., "I'm fascinated by novelties"). The answers are given using 5-point ratings (1 = *very false for me* to 5 = *very true for me*). Cronbach's  $\alpha$  for the five scales was 0.85, 0.86, 0.87, 0.92, and 0.85, respectively.

## 2.4 Data Analysis Approach

To predict daily prosocial behavior (at Level 1) based on inter- (Level 2) and within-individual (Level 1) variability of variables, we applied multilevel hierarchical linear regression (Raudenbush & Bryk, 2002). It allows to take account of the nested data structure resulting in robust standard errors and unbiased regression coefficients.

Before conducting our analyses, we examined whether prosocial behavior, POS, and PA differed within individuals. Then, to test our hypotheses, we followed Baron and Kenny's (1986) general approach. Specifically, we tested a hypothesized model of relationships between variables (Fig. 1), running a series of multilevel hierarchical linear regressions (Raudenbush & Bryk, 2002). Grand-mean centering inter-individual (Level 2) predictors and person-mean centering within-individual predictors (Level 1) allowed us to separately examine inter-individual (Level 2) variability and within-individual variability (Level 1), respectively, as these variables predicts different proportions of variance in the outcome.

As a first step, we ran multilevel regression in which (1) person-mean centered (within-individual variability) POS and (2) grand-mean centered (inter-individual variability) POS were posited as predictors of daily prosocial behavior. This model can be represented formally as follows:

$$\text{daily\_prosocial\_behavior}_{ij} = \beta_{0j} + \beta_{1j}(\text{POS}_{ij}) + r_{ij} \quad (1)$$

$$\beta_{0j} = \gamma_{00} + \gamma_{01}(\text{POS}_i) + r_{0i} \quad (2)$$

Then, the second multilevel regression model was tested in which both person-mean centered (within-individual variability) POS and grand-mean centered (inter-individual

variability) POS were posited as predictors of daily PA. We also tested if grand-mean centered (inter-individual variability) POS predicted inter-individual variability of PA. This model can be formally represented as follows:

$$PA_{ij=0j} = \beta_{0j} + \beta_{1j}(POS_{ij}) + r_{ij} \quad (3)$$

$$\beta_{0j} = \gamma_{00} + \gamma_{01}(POS_i) + r_{0i} \quad (4)$$

Finally, we regressed daily prosocial behavior on POS and PA, both as person-mean centered variables and grand-mean centered variables. This model can be formally represented as follows:

$$\text{daily\_prosocial\_behavior}_{ij} = \beta_{0j} + \beta_{1j}(POS_{ij}) + \beta_{2j}(PA_{ij}) + r_{ij} \quad (5)$$

$$\beta_{0j} = \gamma_{00} + \gamma_{01}(POS_i) + \gamma_{02}(PA_i) + r_{0i} \quad (6)$$

The critical values for the upper and lower confidence intervals (CI) for indirect effects were tested by using the Monte Carlo method for assessing mediation CI method (Hayes & Scharkow, 2013) with 20,000 replications by means of the online calculator (Selig & Preacher, 2008).

Finally, in all these analyses, sex and personality traits were entered as covariates.

## 3 Results

### 3.1 Descriptive Statistics and Correlations

Means, standard deviations, and correlations are presented in Table 1. As can be seen, all statistically significant correlations were in the expected direction. Specifically, daily prosocial behavior, POS, and PA were all positively and significantly correlated at both levels—within-individual (Level 1) and inter-individual (Level 2). At Level 2, prosocial behavior and PA were significantly and positively correlated with all personality traits except conscientiousness. POS was significantly and positively correlated with all personality traits except openness.

### 3.2 Variance Decomposition

The partitioning of the total variance into within-individual and inter-individual variance showed that 57% of the total variance in prosocial behavior was within persons. As regards POS, 56% of the total variance was within persons, and for PA 52%. These analyses show that a substantial portion of the variance in prosocial behavior, POS, and PA can be attributed to within-individual variation. Thus, prosocial behavior, POS, and PA are changeable and vary not only between people but also in a single person between days.

### 3.3 Hypotheses Testing

Results from multilevel regression analyses are presented in Table 2.



**Table 1** Means, standard deviations, and correlations among variables at Level-1 ( $N=1,119$ ) and Level-2 ( $N=181$ )

	<i>M</i>	<i>SD</i>	1	2	3	4	5	6	7
1. DPROS	16.77	4.87	1	.28**	.36**				
2. POS	27.58	5.15	.32**	1	.54**				
3. PA	27.67	7.23	.43**	.61**	1				
4. Agreeableness	86.79	11.13	.34**	.20*	.20*	1			
5. Conscientiousness	82.32	11.63	-.02	.17*	.08	.05	1		
6. Emotional Stability	66.88	16.58	.18*	.40**	.36**	.25**	.12	1	
7. Extraversion	75.94	11.93	.18*	.37**	.51**	.09	.11	.27**	1
8. Openness	86.80	16.58	.16*	.14	.32**	.22**	.00	.20*	.36**

\*\* $p < .01$ ; \*\* $p < .05$ ; DPROS=daily prosocial behaviour; POS=positive orientation; PA=positive affect; Level-1 (within-individual, daily level) correlations are presented above the diagonal; Level-2 (inter-individual level) correlations are presented below the diagonal

As postulated in Hypotheses 1<sub>a</sub> and 1<sub>b</sub> that inter-individual and within-individual variability of POS are positively associated with daily prosocial behavior, results from the first regression (Step 1) attested a significant and positive prediction of daily prosocial behavior by (1) within-individual variability of POS ( $\beta=0.11$ ,  $SE=0.05$ ,  $p<0.05$ ) and (2) inter-individual variability of POS ( $\beta=0.20$ ,  $SE=0.04$ ,  $p<0.01$ ). Among the covariates, sex, agreeableness, and conscientiousness significantly predicted prosocial behavior. Overall, these results indicate that both, within- and inter-individual variability of POS are positively associated to prosocial behavior. Results from the second multilevel regression (Step 2) indicated that only inter-individual variability of POS (and not within-individual variability of POS) significantly and positively predicted daily PA ( $\beta=0.64$ ,  $SE=0.06$ ,  $p<0.001$ ). Similarly, when predicting inter-individual variability of PA, only inter-individual variability of POS (and not within-individual variability of POS) was significant ( $\beta=0.64$ ,  $SE=0.04$ ,  $p<0.001$ ). Among the covariates, sex, agreeableness, extraversion, and openness significantly predicted PA. These findings suggest that daily PA (i.e., within-individual variability of PA) is mostly associated with relatively stable individual differences in POS (i.e., inter-individual variability of POS).

Finally, after establishing that (1) POS was significantly related to prosocial behavior and (2) inter-individual variability of POS was significantly related to PA, results from the third multilevel regression (Step 3) showed that inter-individual variability of PA significantly and positively predicted daily prosocial behavior ( $\beta=0.27$ ,  $SE=0.04$ ,  $p<0.001$ ). Thus, Hypothesis 2<sub>a</sub> which states that inter-individual variability of PA is positively associated with daily prosocial behavior was supported, while Hypothesis 2<sub>b</sub> which states that within-individual variability of PA is positively associated with daily prosocial behavior was not. Furthermore, as the effect of inter-individual variability of POS and within-individual variability of POS was reduced to zero when PA was adjusted for, the results from the third multilevel regression indicate that PA completely mediates the relationship between POS (at the inter-individual level) and prosocial behavior. The indirect effect linking inter-individual variability of POS to prosocial behavior turned out to be significant (0.17; CI 95% LL=0.126, UL=0.224), supporting Hypothesis 3<sub>a</sub> which states that inter-individual variability of PA mediates the relationship of inter-individual variability of POS to daily prosocial behavior. Thus, individual differences in POS contribute to individual

**Table 2** Summary for hierarchical linear multilevel regressions testing our mediation model

	$\beta$	<i>SE</i>	<i>p</i>	CI 95%(highest; lowest)
<b>Step 1 (DV: DPROS)</b>				
POS L1	0.105	.052	.046	0.207, 0.002
POS L2	0.199	.043	< .001	0.283, 0.115
DPROS <sub>t-1</sub>	- 0.101	.055	.065	0.006, - .209
Sex	1.553	.492	.002	2.518, 0.588
Agreeableness	0.127	.021	< .001	0.169, 0.085
Extraversion	0.030	.019	.110	0.068, - 0.007
Conscientiousness	- 0.052	.017	.003	- 0.019, - 0.086
Emotional Stability	0.019	.043	.163	0.048, - 0.008
Openness	0.024	.019	.212	0.061, - 0.014
- 2 <i>Log (lh)</i>	5322.41			
<i>df</i>	13			
<b>Step 2 (DV: intra-individual daily PA)</b>				
POS L1	0.063	.080	.429	0.220, - 0.094
POS L2	0.639	.060	< .001	0.757, 0.520
PA <sub>t-1</sub>	0.004	.053	.942	0.108, - .0100
Sex	- 3.048	.688	.002	2.518, 0.588
Agreeableness	0.096	.029	.001	0.155, 0.038
Extraversion	0.153	.027	< .001	0.205, 0.100
Conscientiousness	- 0.002	.024	.950	0.047, - 0.049
Emotional Stability	- 0.011	.020	.562	0.028, - 0.051
Openness	0.076	.027	.005	0.128, 0.023
- 2 <i>Log (lh)</i>	5882.56			
<i>df</i>	12			
<b>Step 2 (DV: inter-individual PA)</b>				
POS L1	- 0.002	0.041	.971	0.079, - 0.820
POS L2	0.640	0.035	< .001	0.709, 0.571
Sex	- 2.65	0.401	< .001	- 1.864, - 3.439
Agreeableness	0.079	0.017	< .001	0.113, 0.044
Extraversion	0.160	0.015	< .001	0.191, 0.130
Conscientiousness	- 0.003	0.014	.799	0.024, - 0.032
Emotional Stability	0.002	0.012	.838	0.025, - 0.020
Openness	0.075	0.016	< .001	0.106, 0.044
- 2 <i>Log (lh)</i>	6088.95			
<i>df</i>	11			
<b>Step 3 (DV: DPROS)</b>				
POS L1	0.079	.056	.159	0.189, - 0.031
POS L2	0.022	.048	.642	0.117, - 0.072
PA L1	0.041	.037	.159	0.114, - 0.033
PA L2	0.274	.037	< .001	0.349, 0.200
DPROS <sub>t-1</sub>	- 0.108	.054	.046	- 0.002, - 0.215
Sex	2.287	.488	< .001	3.244, 1.330
Agreeableness	0.105	.021	< .001	0.146, 0.064
Extraversion	- 0.013	.019	.489	0.025, - 0.051

**Table 2** (continued)

	$\beta$	<i>SE</i>	<i>p</i>	CI 95%(highest; lowest)
Conscientiousness	- 0.050	.017	.003	- 0.017, - 0.084
Emotional Stability	0.019	.014	.161	0.047, - 0.008
Openness	0.003	.019	.853	0.040, - 0.033
- 2 <i>Log (lh)</i>	5279.90			
<i>df</i>	15			

DV = dependent variable; DPROS = daily prosocial behaviour; POS = positive orientation; PA = positive affect;  $t_{-1}$  = previous day; L1 = level 1 (within-individual variability, daily level); L2 = level 2 (inter-individual variability, individual level)

differences in PA, which in turn are positively related to daily prosocial behavior. Hypothesis 3<sub>b</sub>, which states that within-individual variability of PA mediates the relationship of within-individual variability of POS to daily prosocial behavior was not supported due to lack of statistically significant relationships between within-individual variability of POS and PA and inter-individual variability of PA and daily prosocial behavior. Thus, daily fluctuations of POS are rather directly than indirectly (through PA) related to daily prosocial behavior.

### 3.4 Alternative Models

To further explore if prosocial behavior predicted within-individual variability of personal resources over time, we also performed two multilevel regression analyses in which within-individual variability of prosocial behavior and inter-individual variability of prosocial behavior were posited as predictors of (1) within-individual variability of POS and (2) within-individual variability of PA. The results of these analyses (Table 3) attested a significant prediction of within-individual variability of POS ( $\beta = 0.25$ ,  $SE = 0.03$ ,  $p < 0.001$ ) and within-individual variability of PA ( $\beta = 0.54$ ,  $SE = 0.07$ ,  $p < 0.001$ ) only by inter-individual variability of prosocial behavior. Within-individual variability of prosocial behavior, in contrast, proved not to be a significant predictor. Thus, general tendency to undertake prosocial acts, rather than daily fluctuations in prosocial behavior, is positively related to daily POS and daily PA.

## 4 Discussion

The focus of the present research was the dynamics of the relationships between PA, POS, and prosocial behavior, taking into account within-individual variability of daily beliefs, affect, and behavior and inter-individual variability of PA and POS. In this way, we extended the evidence concerning the role of personal resources coming from the inter-individual level of analysis and demonstrated that it cannot be extrapolated to the within-individual level (e.g., Bolger & Laurenceau, 2013; Kozlowski & Klein, 2000).

First, we demonstrated that even when adjusting the results for personality traits, sex, and prosocial behavior during the previous day, POS—treated both as a general tendency to see oneself, life, and future in a positive light and as daily positive beliefs—meaningfully

**Table 3** Summary for hierarchical linear multilevel regressions testing alternative models

	$\beta$	<i>SE</i>	<i>p</i>	CI 95% (highest; lowest)
<b>DV: L1 DPOS</b>				
PROS L1	- 0.020	.057	.731	0.093, - 0.132
PROS L2	0.242	.047	< .001	0.335, 0.148
DPOS <sub>t-1</sub>	0.014	.056	.798	0.124, - .096
Sex	0.416	.521	.425	1.439, - 0.588
Agreeableness	0.011	.023	.636	0.056, - 0.034
Extraversion	0.106	.019	< .001	0.143, 0.068
Conscientiousness	0.030	.018	.107	0.066, - 0.006
Emotional Stability	0.083	.014	< .001	0.111, 0.055
Openness	- 0.018	.020	.376	0.022, - 0.057
- 2 <i>Log (lh)</i>	5403.78			
<i>df</i>	13			
<b>DV: L1 DPA</b>				
PROS L1	0.058	.080	.466	0.213, - 0.098
PROS L2	0.543	.065	< .001	0.671, 0.414
DPA <sub>t-1</sub>	0.028	.050	.579	0.127, - .071
Sex	- 3.485	.712	< .001	- 2.087, 4.884
Agreeableness	0.053	.031	.095	0.115, - 0.009
Extraversion	0.204	.026	< .001	0.255, 0.152
Conscientiousness	0.040	.025	.111	0.089, - 0.009
Emotional Stability	0.030	.020	.128	0.069, - 0.069
Openness	0.055	.027	.045	0.1098, 0.001
- 2 <i>Log (lh)</i>	5921.59			
<i>df</i>	13			

DV = dependent variable; PROS = prosocial behaviour; DPOS = daily positive orientation; DPA = daily positive affect; <sub>t-1</sub> = previous day; L1 = level 1 (within-individual variability, daily level); L2 = level 2 (inter-individual variability, individual level)

predicted daily prosocial behavior. Thus, we extended the evidence showing that people higher in POS tend to be more prosocial (Castellani et al., 2016; Luengo Kanacri et al., 2017). This endorses theoretical postulates that POS is a set of beliefs which allow a person to approach reality in a positive way and stimulate virtuous interactions with others (Caprara et al., 2019). These positive beliefs are expected to set the premises for rewarding social experiences and inspire people to engage in helping, sharing, and caring for others. Moreover, our analyses of alternative models revealed that daily POS contributes to daily prosocial actions, and not vice versa. However, a reciprocal relationship may be considered when looking at inter-individual differences.

Second, we found that PA played a different role at the inter-individual and within-individual levels in predicting prosocial behavior. While a general tendency to experience positive moods and emotions in different circumstances leads people to engage in acts of kindness and charity, their daily positive feelings are not related to their daily prosocial acts, when controlling for trait PA. This supports theoretical predictions and the previous findings demonstrating that high trait levels of PA lead to sociability while

high state levels of PA may not (Moore et al., 2018). Indeed, the predictive power of PA captured at different levels is different (George, 1991), and this should be acknowledged in future studies. Our results show that when capturing trait positive affectivity, daily PA does not demonstrate daily bidirectional within-individual associations with prosocial behavior observed in previous study (Snippe et al., 2018). PA as a trait-level characteristic is thus not outweighed by situation factors, daily changes of affective experiences. Therefore, we point to importance of differentiating and controlling in research for both, PA as a stable prevalence of pleasant emotions and positive but volatile emotional experiences that fluctuate over time.

Third, our results demonstrate that different dynamic mechanisms operate at the inter- and intra-individual levels. At the inter-individual level PA serves as a mediator—the general positive appraisals of events lead to positive affectivity, which in turn stimulates prosocial behavior in a specific situation. At the within-individual level there is a direct link between POS and prosocial behavior—positive appraisals of events during a specific day contribute directly to helpful interactions with other people, and daily affective experiences do not play a mediating role in this relationship. Once more, this confirms that knowledge coming from single-level analyses cannot be easily extrapolated to other levels (Bolger & Laurenceau, 2013). Future research on within-individual personality structures and processes (Cervone, 2005) are therefore called for to advance our understanding of personality and individual's functioning.

Furthermore, we demonstrated that not only prosocial behavior and PA but also POS can be considered at the inter- and within-individual level, as in fact all these constructs demonstrate within-individual variability. PA and behavior were treated as malleable for a long time, but POS was not. Therefore, our results further the understanding of POS, which was considered a trait-like disposition to view life under a positive light and treated as relatively stable and moderately inherited (Caprara et al., 2009). Even if heredity indeed accounts for a large part of its variance, there remains substantial portion of the variance that is situation/event-dependent and represents changeable within-individual appraisals of oneself and experience. This opens the doors for the development of interventions that may increase POS, even on a daily basis, and thus contribute to people's successful adaptation (Caprara et al., 2019).

#### 4.1 Limitations

When examining prosocial behavior, we concentrated on daily behavior such as helping, sharing, caring rather than on actions that may occur once in a longer period of time (e.g., donating money to charity). Investigating the role of personal resources in prosocial acts that occur relatively rarely may be a direction of future research. Moreover, in this study we captured within-individual variability in PA experienced daily and measured each evening, thus more evidence concerning affective experiences coming from multiple daily evaluations (e.g., using the experience sampling, Bolger & Laurenceau, 2013) is needed to further attest the role of momentary changes in PA for prosocial behavior.

Our results come from a convenience sample of undergraduates, part of which were psychology students and most of them were women. We adjusted all results for sex; however, still the generalization of our findings is limited to relatively young people and especially women. More research is thus needed to further test relationships between POS, PA and prosocial behavior in other samples.

In the present research we did not control for how personally relevant those prosocial acts we were asking about every day were to the participants. The role of beliefs about oneself, life, and the future, as well as affect, may be more prominent when prosocial behavior is highly important to a person. Future research may therefore examine personal prosocial goals (Laguna, 2019) as personally salient prosocial actions.

## 4.2 Implication for Practice

As our study contributes to explaining prosocial behavior, based on its results we may propose some recommendations on how to stimulate prosocial behavior. Such interventions are of high societal interest due to the observed decrease of concern for others, especially in young people (Twenge et al., 2012). Concentrating not on the macro-level factors (e.g., culture, religion) which are not easy to change, but on the micro-level psychological factors, our study indicates the malleability of prosocial behavior, affect, and positive beliefs. The results suggest that people are equipped with an ability to adjust to various situations across time, and we can expect that such changes may be facilitated through psychological interventions. By stimulating the general tendency to cultivate positive affective experiences and to view life in a positive light, it is possible not only to prevent people from depression (Kemeny et al., 2012) but also to make them more willing to notice and answer other people's needs. The tendency to act prosocially may in turn result in more positive daily affect and a more positive daily view of life.

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**Data availability** The dataset is available from the corresponding author on reasonable request.

## Declarations

**Conflicts of interest** The authors declare no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

**Ethical approval** All procedures performed in this study were in accordance with the ethical standards of the institutional research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

**Informed consent** Informed consent was obtained from all individual participants included in the study.

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