Who helping helps: An event-sampling study of how basic psychological needs moderate the impact of acting prosocially

Bryant Pui Hung Hui & Aleksandr Kogan

To cite this article: Bryant Pui Hung Hui & Aleksandr Kogan (2017): Who helping helps: An event-sampling study of how basic psychological needs moderate the impact of acting prosocially, The Journal of Positive Psychology, DOI: 10.1080/17439760.2017.1365165

To link to this article: http://dx.doi.org/10.1080/17439760.2017.1365165
Who helping helps: An event-sampling study of how basic psychological needs moderate the impact of acting prosocially

Bryant Pui Hung Hui and Aleksandr Kogan

Department of Psychology, University of Cambridge, Cambridge, UK

ABSTRACT
Growing work suggests that prosociality – actions such as kindness and generosity – boosts the well-being of altruists, yet this effect is not universally true for all individuals. Thus, a major question moving forward is who reaps the largest benefits of acting prosocially. Here, we propose that trait differences in satisfaction of needs (i.e. autonomy, competence, and relatedness) act as key moderators of the effect of prosociality on well-being. We tested two competing hypotheses – deprivation vs. sensitization models – in a 14-day event-sampling study of 383 community participants. We found that people with lower trait autonomy experienced a greater well-being boost after acting prosocially than their higher counterparts. Moreover, this relationship was further mediated by state autonomy. Our findings highlight the special role autonomy, but not competence or relatedness, plays in explaining individual differences in who benefits from acting prosocially – and the mechanism behind this process.

Numerous studies have demonstrated the beneficial effect of prosociality – acting kindly or generously towards others – on various types of well-being (see Hui, Berzaghi, Cunningham-Amos, & Kogan, 2016, for a review). For instance, evidence is growing that suggests donating money (Dunn, Aknin, & Norton, 2008), volunteering (Son & Wilson, 2012), sacrificing for romantic partners (Kogan et al., 2010), and even having a trait disposition towards kindness (Le, Impett, Kogan, Webster, & Cheng, 2012) are related to having higher personal well-being and more fulfilling relationships. These effects appear to be ubiquitous, found across most societies in the world and even after controlling for the income level and other relevant variables (Aknin et al., 2013). Yet there is also increasing evidence that the effects can vary quite dramatically between individuals (e.g. Musick & Wilson, 2003; Tkach, 2005); thus, a major question moving forward within the literature is understanding who benefits the most from acting prosocially and the mechanisms behind these individual differences.

We propose that one answer can be derived from self-determination theory (SDT; Deci & Ryan, 2000), a framework of psychological needs that has been particularly useful in understanding well-being dynamics. In particular, we build upon theorizing and empirical data in the SDT and prosociality literature to identify two competing hypotheses for how individual differences in satisfaction of needs – the deprivation model vs. sensitization model – can moderate the impact of daily prosocial acts on well-being. To test these models, we conducted an event-sampling study in which participants rated their trait satisfaction of needs at the beginning of the study, and then reported on state satisfaction of needs, prosocial acts, and well-being four times a day over a two-week period. Our aim in the study was twofold: (a) Examine how the SDT dimensions moderate the impact of daily prosocial acts on well-being, and (b) test a mediational pathway for explaining the moderations. Through this approach, we hoped to provide new insight into who benefits the most from prosocial actions and why this occurs.

Moderating the prosociality to well-being link: Two competing hypotheses

In SDT, there are three basic psychological needs: autonomy (the need to experience choice and psychological freedom), competence (the need to feel effective or a sense of mastery), and relatedness (the need to feel connected with significant others) (Deci & Ryan, 2000). The theory holds that these three needs are innate psychological nutriments essential for well-being. Supporting this thesis, researchers have found that trait-level satisfaction of the three needs...
and daily fluctuations of the needs (after removing trait-level variance) can predict daily well-being (Reis, Sheldon, Gable, Roscoe, & Ryan, 2000). Reis and colleagues (2000) have also demonstrated the independent contribution of each need for daily well-being. Such satisfaction of needs occurs from various daily acts that can boost or deplete well-being; for example, engaging in meaningful talks and feeling understood and appreciated were strongly related to daily relatedness (Reis et al., 2000), Facebook use predicts relatedness (Sheldon, Abad, & Hinsch, 2011), and coach’s autonomy support is related to the satisfaction of needs of athletes (Adie, Duda, & Ntoumanis, 2012). We reasoned that since (a) acting prosocially is related to well-being, and (b) there are sensible theoretical pathways from various daily acts to satisfaction of the three needs, daily prosocial acts are a natural candidate for influencing the basic psychological needs.

However, to date, there has been only limited work on understanding how prosociality fits within the SDT framework on well-being attainment. Dunn, Aknin, and Norton (2014) explained how satisfaction of each psychological need might boost the effect of prosocial spending on happiness. However, what remain understudied is how satisfaction of each need might boost the effect of giving of resources other than money on happiness. Therefore, complementing previous research, our work investigates how individual differences in each trait satisfaction of psychological needs and variations of state satisfaction of psychological needs predict the effect of daily prosocial acts – not only money giving – on well-being.

Furthermore, SDT to date has not been used to understand how individual differences in satisfaction of autonomy, relatedness, and competence might moderate the effect of acting prosocially on well-being. Thus, our objective was to study this question directly. At first pass, the answer may appear intuitively simple: People who have lower levels of satisfaction of needs should get the biggest reward from acting prosocially if such acts indeed satisfy the psychological needs. We term this hypothesis the deprivation model. Indeed, there is some evidence from other areas of SDT research that support the deprivation model. For instance, van Prooijen (2009) found that people were more sensitive to the fairness of decision-making procedures when they experienced little as opposed to a lot of autonomy in their life.

However, research within the SDT tradition is suggestive of an alternative possibility as well: That, paradoxically, those who have the highest levels of satisfaction of needs will benefit the most from acting prosocially. This idea is called the sensitization model. The model emerges from research that has found that people with higher trait-level connectedness tended to show a stronger relationship between daily-level relatedness and well-being (Reis et al., 2000). One possibility for the reason this process occurs is that people with higher levels of satisfaction of a particular need may place higher value meeting the social demands of the need. For example, if one has higher levels of connectedness, she may value spending time with close others more and thus do so. Furthermore, because of the greater focus on the behaviors associated with the need, she may reap more rewards from the acts as they are more in line with personal values and thus are more authentic – and research on authenticity has documented a wide variety of well-being benefits for those experience greater authenticity, including higher self-esteem, better overall psychological functioning, and greater subjective well-being (e.g. Kernis & Goldman, 2006).

A second factor that makes the question of SDT’s role in moderating the prosociality to well-being link not so straightforward: The independent roles of each need. There is a sensible argument for prosociality increasing people’s experience of autonomy, relatedness, and competence. In particular, a study by Aknin, Dunn, Sandstrom, and Norton (2013) demonstrates that when people spent a Starbucks gift card on a friend (versus on themselves), they would be happier. One possible reason is that their relatedness is fulfilled in the prosocial act. Another study shows that if people realized their donation could make a tangible change for people in need (i.e. a bed net to minimize the risk of getting malaria vs. funding a variety of child health care initiatives), they garnered higher subjective well-being (Aknin, Dunn, Whillans, Grant, & Norton, 2013), possibly due to their perceived competence via the induced positive and meaningful change for other people. Yet do all three needs independently increase as a function of prosocial action? And are all three independently involved in explaining why prosocial action boosts well-being? This is a key empirical question with significant implications for well-being theory and also application.

**Mechanism behind the moderation**

The closest clue for understanding the mechanism behind why SDT might moderate the prosociality to well-being link is from past research which demonstrates that satisfaction of needs mediates the link between motivation and well-being. In particular, researchers found that there was a positive link between well-being and (a) autonomous motivation for prosocial acts (Weinstein & Ryan, 2010) and (b) volunteer motivation (Kwok, Chui, & Wong, 2013), and that the SDT dimensions could mediate this relationship. Weinstein and Ryan (2010) also showed that the three needs independently (especially autonomy and relatedness) mediated the autonomous motivation for prosocial acts to daily well-being link. That is, autonomous (versus controlled) prosocial motivation predicts a higher level of...
well-being, and that this relationship was driven by satisfaction of needs.

The above findings provide a basis for theorizing that SDT dimensions can act not only as moderators (as we discussed in the previous section), but also as mediators of the prosociality to well-being link. To date, however, these two ideas have not been combined to examine a mediated moderation framework. Furthermore, since the three needs are described as basic and yet distinct psychological nutriment (Reis et al., 2000), distinguishing the independent effects of the three needs in the link is crucial. Therefore, we considered the three construct-matched, trait-state pairs (e.g. trait autonomy matches state autonomy) and conducted mediated moderation analyses.

**Present study**

We aimed to (a) test the moderating role of autonomy, relatedness, and competence on the relationship between prosocial acts and well-being, and (b) examine whether satisfaction of state needs acted as the key mediator of this effect (mediated moderation). To do so, we employed event-sampling methodology, which allowed us to assess both the trait- and state-levels of autonomy, relatedness, and competence. Specifically, participants first completed an individual difference measure of trait needs in a background survey, and then were asked to complete 4 daily measures of state needs, prosocial acts, and well-being every day for a 2-week event-sampling study. We examined how each need separately contributed to the effect of prosocial acts on well-being, as well as the unique effect of each need while controlling for the other two needs.

**Method**

**Participants & procedure**

We recruited a community sample of 383 participants (270 females; $M_{age} = 27.80$, $SD = 9.13$, age ranged 18–65) from cities of Boston, Chicago, New York, Los Angeles, Dallas, Seattle, Washington DC, and the San Francisco Bay Area through online advertisements on Craigslist.org. Participants were from a variety of ethnic backgrounds: 49% Caucasian; 14% African–American; 9% Latino; 9% East Asian–American; 5% South Asian–American; 3% Southeast Asian–American; and 11% other ethnicities or did not indicate any ethnicities.

After the participants agreed to take part in the study, they first completed a background survey online with all person-level measures. After that, they installed a mobile app called Mutual-Science.org for our event-sampling study. The app was available for both iPhone and Android phone users. We programmed the app to beep participants four times per day for 2 weeks at 8:00 am, 12:00 noon, 4:00 pm, and 8:00 pm. Participants had a four-hour interval to respond to each beep. For each beep session, they were prompted to complete a 2-min survey using their phone via our study app. After two weeks, participants were paid from $5 to $20 Amazon gift card, based on the number of completed sessions, to compensate them for their time. Participants completed an average of 27.36 (out of 56) sessions for a total of 10,479 sessions.

**Background measures**

**Trait satisfaction of psychological needs**

We employed the 21-item General Need Satisfaction Scale as a measure of trait satisfaction of psychological needs (Ilardi, Leone, Kasser, & Ryan, 1993). Participants indicated on a scale from 1 (not at all true) to 7 (very true) the extent to which satisfaction of trait autonomy (7 items; $\alpha = 0.77$), competence (6 items; $\alpha = 0.79$), and relatedness (8 items; $\alpha = 0.79$). Examples of items are ‘I feel like I can pretty much be myself in my daily situations’ (autonomy), ‘Often, I do not feel very competent’ (competence, reversed), and ‘There are not many people that I am close to’ (relatedness, reversed).

**Session measures**

**Prosocial acts**

Each session, participants were asked ‘How many acts have you engaged in in the past couple of hours that involved helping someone else or doing something for a good cause?’, which was modified from previous prosocial engagement measure (Weinstein & Ryan, 2010). They indicated the number of prosocial acts on a drop-down menu ranging from 0 to 10+. We found that the vast majority (80%) of the responses were either 0 or 1 act, and thus there was a massive skew to the left. Given the potential impact a few outliers can have on a regression model’s slope estimates, we elected to dichotomize the data into a single variable and use contrast coding for it: ‘0’ was coded as ‘have not had any prosocial acts ($-0.5$)’, and the responses other than ‘0’ were coded as ‘had prosocial acts ($0.5$)’. Forty percent of the sessions showed the presence of prosocial acts with an average of 2.14 prosocial acts per session.

**State psychological needs**

Each session, we measured participants’ satisfaction of state psychological needs using a nine-item Basic Psychological Needs Scale (La Guardia, Ryan, Couchman, & Deci, 2000). Corresponding to satisfaction of trait psychological needs, satisfaction of state psychological needs also had three components: Autonomy (3 items; Average $\alpha = 0.67$), competence (3 items; Average $\alpha = 0.77$), and...
relatedness (3 items; Average $\alpha = 0.70$). Examples of items include ‘In the past couple of hours, I felt to be who I am’ (autonomy) and ‘In the past couple of hours, I felt very capable and effective’ (competence). All items were completed on 7-point scales ranging from 1 (not at all true) to 7 (very true).

**State affect**

Each session, participants answered questions about their positive and negative affect using the nine-item Emmons Mood Indicator (Diener & Emmons, 1985). Examples of positive affect were ‘joyful, happy, and enjoyment/fun’ (4 items; Average $\alpha = 0.95$), and that of negative affect were ‘depressed, worried/anxious, and unhappy’ (5 items; Average $\alpha = 0.92$). Participants were asked to indicate ‘How much of each did you feel in the past couple of hours?’ using 7-point scales ranging from 1 (not at all) to 7 (extremely). Score for state affect was computed by the following formula: positive affect – negative affect.

**State subjective happiness**

Each session, participants indicated their general happiness on an abbreviated two-item version of the Subjective Happiness Scale (Lyubomirsky & Lepper, 1999; Average $\alpha = 0.93$): ‘In the past couple of hours, in general, I considered myself: 1 (not a very happy person) to 7 (a very happy person)’ and ‘In the past couple of hours, compared to most of my peers, I considered myself: 1 (less happy) to 7 (more happy).’

A state hedonic well-being composite was derived by summing up the z-scores of state positive affect, negative affect (reversed), and subjective happiness.

**Results**

**Data analysis approach**

The present data has a multilevel structure with session measures (Level 1 within-person) nested within individuals (Level 2 between-person). Thus, we analyzed the data using multilevel modeling framework (Raudenbush & Bryk, 2002), which was implemented via the lme4 package in R (Bates, Maechler, Bolker, & Walker, 2015). All level 1 predictors (i.e. state autonomy, competence as well as relatedness, state affect, state subjective happiness, and state hedonic well-being composite) except prosocial acts were centered on the individuals’ means (group means centering), while all level 2 variables (i.e. trait autonomy, competence, and relatedness) were centered on the full sample’s means (grand means centering). Since we had level 2 variables and cross-level interaction terms, our models were specified with random intercepts and random slopes. We tested simple slopes at 1 standard deviation above and below the mean of moderators.

**Preliminary analysis**

Intraclass correlations for repeated session (i.e. state) variables of prosocial acts, autonomy, competence, relatedness, affect, subjective happiness, and hedonic well-being composite were 0.28, 0.59, 0.63, 0.58, 0.62, 0.77, and 0.71, respectively, indicating that a substantial portion of variance came from between-person variation. Thus, introducing level 2 variables – satisfaction of the three trait needs – to between-person analyses were appropriate. Moreover, before testing our predictions, we examined the variance of slopes of prosocial acts in predicting state well-being indicators to see whether these slopes varied significantly across individuals. The results indicated that the slopes of prosocial acts in predicting state affect, $\tau^2 = 76.64, SD = 8.75, 95\% CI [7.58, 10.03]$, state subjective happiness, $\tau^2 = 5.06, SD = 2.25, 95\% CI [1.70, 2.80]$, and state hedonic well-being composite, $\tau^2 = 45.28, SD = 6.73, 95\% CI [5.76, 7.78]$ – which suggested that the within-person effect of prosocial acts on well-being varied significantly across individuals, and thus the investigation of between-person moderators (i.e. cross-level interaction) was justified.

**Moderation models of trait psychological needs**

Before testing our moderation model which included all three trait psychological needs, we first examined whether satisfaction of each trait psychological need (i.e. autonomy, competence, or relatedness) could separately moderate the effect of prosocial acts on state well-being. The state well-being ($WB_{state}i$) was estimated by the following equation:

$$WB_{state}i = \gamma_{00} + \gamma_{10}PA_{state}i + \gamma_{01}N_{trait}i + \gamma_{11}(N_{trait}i \times PA_{state}i) + (u_{0i} + u_{1i}PA_{state}i + r_{ie})$$

where $PA_{state}i$ represents the value on each session (i) for each person (j) of prosocial acts (presence or absence); $N_{trait}i$, represents trait need satisfaction (i.e. autonomy, competence, or relatedness). $N_{trait}i \times PA_{state}i$, is the interaction term between the two corresponding variables; $\gamma_{00}$ is the overall intercept for well-being of an average person; $\gamma_{10}$ refers maximum likelihood estimate of the population slope estimating state well-being from state prosocial acts; $\gamma_{01}$ represents maximum likelihood estimate of the population slope estimating average level of well-being across all
sessions from either trait autonomy, competence, or relatedness; γ1i represents maximum likelihood estimate of the population slope estimating average level of well-being across all sessions from the interaction term between either one trait psychological need and state prosocial acts; the last parenthetical term represents the random effects in which the u0j reflects the person-specific deviation of the intercept from the overall intercept, uij reflects the person-specific deviation of the corresponding slope from the overall slope, and ri is error. The key coefficient of interest to test our model is γ1i, which is expected to be significant.

We found that trait autonomy and prosocial acts interacted significantly to predict state affect, γ1i = −2.21, SE = 0.61, t(272) = −3.64, p < 0.001, 95% CI [−3.41, −1.02], state subjective happiness, γ1i = −0.60, SE = 0.22, t(262) = −2.79, p = 0.006, 95% CI [−1.04, −0.18], and state hedonic well-being composite, γ1i = −1.87, SE = 0.49, t(269) = −3.85, p < 0.001, 95% CI [−2.83, −0.92] (see Table S1 in Online Supplementary Material). Simple slope tests revealed a large difference in the magnitude of the prosociality to well-being effects. Specifically, individuals with lower trait autonomy had a stronger link between acting prosocially and state well-being − affect, γ10 = 10.45, SE = 0.86, t(279) = 12.14, p < 0.001, 95% CI [8.76, 12.16], subjective happiness, γ10 = 2.55, SE = 0.31, t(274) = 8.23, p < 0.001, 95% CI [1.94, 3.17], and hedonic well-being composite: γ10 = 8.39, SE = 0.69, t(276) = 12.17, p < 0.001, 95% CI [7.04, 9.77] − than individuals with higher trait autonomy did − affect, γ10 = 6.04, SE = 0.88, t(268) = 6.89, p < 0.001, 95% CI [4.32, 7.77] − subjective happiness, γ10 = 1.34, SE = 0.31, t(255) = 4.27, p < 0.001, 95% CI [0.72, 1.96], and hedonic well-being composite, γ10 = 4.66, SE = 0.70, t(263) = 6.65, p < 0.001, 95% CI [3.29, 6.05].

We found that trait competence significantly moderated the effect of prosocial acts on the state hedonic well-being composite, γ1i = −0.88, SE = 0.44, t(267) = −2.01, p = 0.045, 95% CI [−1.74, −0.02], but only marginally moderated the prosocial effect on state affect, γ1i = −0.95, SE = 0.54, t(273) = −1.75, p = 0.081, 95% CI [−2.03, 0.12], and state subjective happiness, γ1i = −0.36, SE = 0.19, t(258) = −1.83, p = 0.069, 95% CI [−0.74, 0.03] (Table S2). By testing simple slopes of prosocial acts and state hedonic well-being composite, we found that individuals with lower trait competence had a stronger link between acting prosocially and hedonic well-being composite, γ1i = 7.45, SE = 0.70, t(279) = 10.60, p < 0.001, 95% CI [6.07, 8.84], than individuals with higher trait competence did, γ10 = 5.44, SE = 0.72, t(258) = 7.60, p < 0.001, 95% CI [4.04, 6.85].

As for trait relatedness, there were only marginally significant moderation effects of trait relatedness and prosocial acts in predicting state affect, γ1i = −1.22, SE = 0.63, t(273) = −1.93, p = 0.055, 95% CI [−2.47, 0.02], and state hedonic well-being composite, γ1i = −0.91, SE = 0.51, t(266) = −1.79, p = 0.075, 95% CI [−1.91, 0.09], and no such moderation effect in predicting state happiness, γ1i = −0.08, SE = 0.23, t(253) = −0.33, p = 0.741, 95% CI [−0.52, 0.37] (Table S3).

In sum, only trait autonomy was a significant moderator in all models, while trait competence and relatedness were significant or marginally significant in some models. All simple slope tests provided initial evidence to support the deprivation model over the sensitization model. We next tested the unique contribution of each trait satisfaction of needs controlling for the other two, with a focus on trait autonomy.

### Independent moderation model of trait autonomy

To examine the unique impact of satisfaction of each trait need, we introduced satisfaction of the other two needs and their interaction terms with prosocial acts into our first equation. Therefore, the state well-being was estimated by the following equation:

\[
WB_{\text{state}}_{ij} = \gamma_{00} + \gamma_{10}PA_{\text{state}}_{ij} + \gamma_{01}\text{AUTO}_{\text{trait}j} + \gamma_{02}\text{COM}_{\text{trait}j} + \gamma_{03}\text{REL}_{\text{trait}j} + \gamma_{11}(\text{AUTO}_{\text{trait}j} \times PA_{\text{state}ij}) + \gamma_{12}(\text{COM}_{\text{trait}j} \times PA_{\text{state}ij}) + \gamma_{13}(\text{REL}_{\text{trait}j} \times PA_{\text{state}ij}) + (u_{0j} + u_{ij}PA_{\text{state}ij} + r_{ij})
\]

where \(PA_{\text{state}ij}\) represents the value on each session (i) for each person (j) of prosocial acts; \(\text{AUTO}_{\text{trait}j}\), \(\text{COM}_{\text{trait}j}\), and \(\text{REL}_{\text{trait}j}\) represent trait autonomy, competence, and relatedness, respectively. \(\text{AUTO}_{\text{trait}j} \times PA_{\text{state}ij}\), \(\text{COM}_{\text{trait}j} \times PA_{\text{state}ij}\), and \(\text{REL}_{\text{trait}j} \times PA_{\text{state}ij}\) are the interaction terms between trait autonomy and prosocial acts, trait competence and prosocial acts, and trait relatedness and prosocial acts, respectively; \(\gamma_{00}\) is the overall intercept for well-being of an average person; \(\gamma_{10}\) refers maximum likelihood estimate of the population slope estimating session-level well-being from session-level prosocial acts; \(\gamma_{11}\) represents maximum likelihood estimates of the population slopes estimating average levels of well-being across all sessions from trait autonomy, competence, and relatedness, respectively; \(\gamma_{12}\) and \(\gamma_{13}\) represent maximum likelihood estimates of the population slopes estimating average levels of well-being across all sessions from the interaction terms between trait autonomy and prosocial acts, trait competence and prosocial acts, and trait relatedness and prosocial acts, respectively; the last parenthetical term is the same as in the first equation. The key coefficient of interest to test our model is \(\gamma_{11}\), which is expected to be significant.
All model estimates are presented as Model 1 in Tables S4 and S5. Specifically, in the presence of other two trait needs – competence and relatedness, as well as their interaction terms with prosocial acts – trait autonomy and prosocial acts interacted significantly to predict state well-being: affect, $\gamma_{11} = -2.89$, SE = 0.89, $t(301) = -3.26$, $p = 0.001$, 95% CI [-4.64, -1.15], subjective happiness, $\gamma_{11} = -0.87$, SE = 0.33, $t(299) = -2.67$, $p = 0.008$, 95% CI [-1.52, -0.23], and hedonic well-being composite, $\gamma_{11} = -2.46$, SE = 0.72, $t(301) = -3.44$, $p < 0.001$, 95% CI [-3.87, -1.05]. However, trait competence and trait relatedness did not significantly interact with prosocial acts in predicting well-being in any models.

Furthermore, as plotted in Figure 1, simple slope tests revealed identical patterns for the relationship between prosocial acts and all well-being indicators, showing that individuals with lower trait autonomy had a stronger relationship between acting prosocially and state well-being – affect, $\gamma_{10} = 11.03$, SE = 1.07, $t(291) = 10.27$, $p < 0.001$, 95% CI [8.92, 13.15], subjective happiness, $\gamma_{10} = 2.77$, SE = 0.39, $t(286) = 7.10$, $p < 0.001$, 95% CI [2.01, 3.55], and hedonic well-being composite, $\gamma_{10} = 8.89$, SE = 0.86, $t(290) = 10.31$, $p < 0.001$, 95% CI [7.20, 10.60], than individuals with higher trait autonomy did – affect, $\gamma_{10} = 5.25$, SE = 1.09, $t(292) = 4.82$, $p < 0.001$, 95% CI [3.11, 7.39], subjective happiness, $\gamma_{10} = 1.03$, SE = 0.40, $t(289) = 2.60$, $p = 0.010$, 95% CI [0.25, 1.81], and hedonic well-being composite, $\gamma_{10} = 3.99$, SE = 0.88, $t(291) = 4.56$, $p < 0.001$, 95% CI [2.27, 5.71]. The above simple slopes showed a large difference in the magnitude of the prosociality to well-being effects. In particular, people low in trait autonomy showed 110 to 169% stronger effects than people high in trait autonomy.

In sum, these results further supported the deprivation model over the sensitization model.

Mediated moderation model of trait autonomy

Our final prediction was that state autonomy would mediate the interactive effect of trait autonomy and prosocial acts on well-being. This prediction fits the mediated moderation model proposed by Muller, Judd, and Yzerbyt (2005), in which mediated moderation happens only when moderation occurs in the first place. Given that in our case a moderation does exist on the main effect, then...
the mediated moderation concerns whether a mediator is responsible for that moderation. That is, the moderation of the treatment effect is reduced once a mediator is controlled for (e.g. Sun, Song, & Lim, 2013). Although moderated mediation and mediated moderation are mathematically identical, their conceptual use is different. The former usually has no overall moderation effect – but our model has a moderation for the main effect (Muller et al., 2005). Therefore, we believe that mediated moderation is more appropriate for testing our conceptual model.

To this end, we conducted a three-step mediated moderation analysis as outlined by Muller et al. (2005). First, the above analysis has shown that the interaction of trait autonomy and prosocial acts predicted well-being. Next, we had to demonstrate that the same interaction could predict state autonomy (i.e. our mediator) (e.g. Sun et al., 2013). The equation for this was the same as the second equation above, but with a different outcome – state autonomy. As shown in Model 2 of Table S4 (same as in Table S5), trait autonomy and prosocial acts interacted significantly to predict state autonomy, \( \gamma_{11} = -1.24, SE = 0.40, t(306) = -3.12, p = 0.002, 95\% CI [-2.03, -0.46]. \) As plotted in Figure 1(d), individuals with lower trait autonomy felt significantly higher satisfaction of state autonomy, when acting prosocially, \( \gamma_{10} = 2.81, SE = 0.48, t(295) = 5.85, p < 0.001, 95\% CI [1.87, 3.76] \) than individuals with higher trait autonomy did, \( \gamma_{10} = 0.33, SE = 0.49, t(297) = 0.67, p = 0.503, 95\% CI [-0.63, 1.29] \) – the non-significance is possibly due to ceiling effect.1

In our final step, we added the mediator of state autonomy into our second equation (i.e. Model 1 in Tables S4 & S5). In the mediated moderation model, the session-level well-being was estimated as follows:

\[
WB_{ij} = \gamma_{00} + \gamma_{10}PA_{ij} + \gamma_{20}AUTO_{ij} + \gamma_{11}AUTOtrait_{ij} + \gamma_{12}COMtrait_{ij} + \gamma_{13}RELtrait_{ij} + \gamma_{21}(AUTOtrait_{ij} \times PA_{ij}) + \gamma_{22}(COMtrait_{ij} \times PA_{ij}) + \gamma_{23}(RELtrait_{ij} \times PA_{ij}) + (u_{0j} + u_{ij}PA_{ij} + u_{2j}AUTO_{ij} + r_{ij})
\]

where \( AUTO_{ij} \) presents the value on each session (i) for each person (j) of state autonomy; \( AUTOtrait_{ij} \times AUTO_{ij}, COMtrait_{ij} \times AUTO_{ij}, \) and \( RELtrait_{ij} \times AUTO_{ij} \) are the interaction terms between trait autonomy and state autonomy, trait competence and state autonomy, and trait relatedness and state autonomy, respectively; \( \gamma_{20} \) refers maximum likelihood estimate of the population slope estimating session-level well-being from state autonomy; \( \gamma_{21}, \gamma_{22}, \) and \( \gamma_{23} \) represent maximum likelihood estimate of the population slope estimating average levels of well-being across all sessions from the interaction terms between trait autonomy and state autonomy, trait competence and state autonomy, and trait relatedness and state autonomy, respectively, acting as covariates in the equation; \( u_{0j} \) and \( u_{ij} \) reflect the person-specific deviation of the corresponding slopes from the overall slopes; all other variables and coefficients are the same as in the second equation. The key coefficients of interest to test our model are \( \gamma_{11} \) (for the interaction term between trait autonomy and prosocial acts), which is expected to be reduced in magnitude compared to the moderation of the overall effect, and \( \gamma_{20} \), which is expected to be significant.

As shown in Model 3 of Tables S4 and S5, the interaction term of trait autonomy and prosocial acts was reduced in magnitude in all three state well-being models: affect, \( \gamma_{20} = -1.55, SE = 0.72, t(299) = -2.16, p = 0.032, 95\% CI [-2.97, -1.14], \) subjective happiness, \( \gamma_{20} = 0.54, SE = 0.28, t(297) = -1.91, p = 0.058, 95\% CI [-1.09, 0.02], \) and hedonic well-being composite: \( \gamma_{20} = -1.39, SE = 0.58, t(305) = -2.42, p = 0.016, 95\% CI [-2.53, -0.26]. \) More importantly, state autonomy significantly predicted all well-being indicators in the models: affect, \( \gamma_{20} = 0.87, SE = 0.03, t(309) = 25.14, p < 0.001, 95\% CI [0.80, 0.94], \) subjective happiness, \( \gamma_{20} = 0.29, SE = 0.02, t(348) = 15.08, p < 0.001, 95\% CI [0.25, 0.32], \) and hedonic well-being composite, \( \gamma_{20} = 0.74, SE = 0.03, t(329) = 24.48, p < 0.001, 95\% CI [0.68, 0.80]. \) All these results demonstrated the mediated moderation model of well-being – with ‘full’ mediated moderation in the subjective happiness model (Muller et al., 2005), and supported the deprivation model over the sensitization model.

We also ruled out alternative hypotheses by testing possible mediators of autonomy and relatedness and influence of individual differences in age and gender (see Online Supplementary Material).

Discussion

Our main and ancillary analyses demonstrated that only the interaction between trait autonomy and state prosocial acts predicted state well-being, and such interaction was further mediated by state autonomy, even after controlling for satisfaction of the other two trait needs, and their interactions with prosocial acts. Collectively, we found strong support for the deprivation model over the sensitization model, such that individuals with lower trait autonomy satisfaction experienced a stronger effect of acting prosocially on state well-being, as compared to the higher trait autonomy satisfaction cohort, and this relationship was further explained by state autonomy.
It is possible that help-givers fulfil the trio of the SDT needs or a subset one of them, which in turn leads to happiness (Weinstein & Ryan, 2010). However, we had no a priori hypothesis about the comparative role of the three SDT needs in driving the prosociality to well-being effect. Yet, one of our main results consistently showed that the individual differences of trait autonomy satisfaction carried unique predictive variance with respect to the relationship between prosocial acts and well-being, indicating that the individual differences of trait competence and relatedness satisfaction are less central in understanding the relationship. We also found that mediation followed our construct-matched framework: It was state autonomy that mediated the trait autonomy by prosociality interaction.

Our results converge with several lines of SDT research. For instance, Sheldon, Elliot, Kim, and Kasser (2001) found that satisfaction of autonomy – over competence and relatedness – was always the most salient predictor in the simultaneous analyses across three studies. In a similar vein, Weinstein and Ryan (2010) found that help-givers reaped more well-being if the prosocial act is autonomous (versus controlled). Their study underscored the importance of autonomous motivation, and suggested that prosocial acts are able to facilitate the fulfilment of autonomy. Our study adds to this literature by highlighting that individual differences in satisfaction of trait autonomy also play a key role.

While our results fully supported the deprivation model, other relevant studies supported the sensitization alternative. In SDT and well-being literatures, some argue that individuals with higher satisfaction of person-level needs may be more sensitive to a given process or value the needs more, and thus their reaction to specific events is stronger (e.g. Moller, Deci, & Elliot, 2010; Reis et al., 2000). Similarly, the behavioral concordance model from personality literature argues that individuals with higher scores on traits of agreeableness and neuroticism experience more positive affect when engaging in behavior that is consonant with those higher traits than individuals with lower scores on the traits do (Côté & Moskowitz, 1998). In contrast, supporting our deprivation model, Sheldon and Gunz (2009) theorized that SDT’s needs can operate in both ways – experiencing high levels sensitizes people to the available rewards, while experiencing low levels motivates specific adaptive desires. The latter functions more strongly, as the evolved psychological needs have to enable people to respond to any potential problems in their daily lives. Also, presumably balanced satisfaction of needs produces optimal well-being (Sheldon & Niemiec, 2006). With limited time and resources, if one invests heavily in one need which is already high in satisfaction, the other two needs may be neglected and resulted in an imbalanced satisfaction of needs. Taken together, both models have received support in different areas of research, and though our work strongly points to the deprivation model, more work is needed to explore if there are conditions under which the sensitization model is better able to explain the role of SDT dimensions in the prosociality to well-being link.

Our work also has several additional implications for the study of prosociality and well-being. First, it extends this area of research by outlining a promising conceptual approach, making a distinction between trait and state satisfaction of needs for understanding the variations of strength in the prosociality to well-being link. Future work should consider experimental designs in a daily naturalistic setting to build on our correlational approach. Aiding this experimental effort, research has already shown that satisfaction of the three needs can be primed (Sheldon & Gunz, 2009). We suggest that researchers manipulate the needs in an event-sampling study, so as to draw possible causal conclusions while maintaining the naturalistic richness of ESM studies. Second, our data provides a rich naturalistic account of the prosociality to well-being link, which is scant in this area, thus adding to a small group of experimental and diary studies that have begun to show that STD’s satisfaction of needs is beneficial in the established relationship of prosociality and well-being. Although both diary and event-sampling study are ecologically valid, the latter shows more nuanced variations. Our event-sampling study is superior to past long-spanning diary studies – the data collected were subject to some degree of distortion. Lastly, complementing previous studies that mainly recruited student or convenient samples, our results are based on a larger, diverse, and community sample. Thus, the generalizability of our results is high. However, it is advisable to test our proposed model in other cultures using the same paradigm. Perhaps, in some collectivistic cultures, satisfaction of relatedness is more salient, thus, individual differences in relatedness, rather than autonomy, may be the moderator in the prosociality to well-being link.

Collectively, our work adds to a growing body of work aimed at understanding the processes that promote well-being, and the underlying mechanisms involved in these processes (see e.g. Dunn et al., 2014 for a review). Through this literature, the hope is to begin to understand the precursors and antecedents of well-being well enough that interventions for improving and maintaining well-being will become more effective. Indeed, there is now growing efforts at the policy level in many governments to promote just this aim (e.g. Halpern, 2014). Our work provides an important step in understanding the role of individual differences in regulating one pathway to well-being – through prosociality. Our hope is that with additional research, practitioners and scientists will be able to develop personalized prosociality-focused interventions rather than using one size fits all model.
Note

1. If simple slopes for the relationship between prosocial engagement and state autonomy were tested for high (0.5 + SD) and low (0.5 – SD) levels of trait autonomy, both slopes were significant: Individuals with lower trait autonomy felt higher satisfaction of state autonomy when acting prosocially, \( \gamma_{10} = 2.19, SE = 0.34, t(284) = 6.50, p < 0.001, 95\% CI [1.53, 2.86] \), than individuals with higher trait autonomy did, \( \gamma_{10} = 0.95, SE = 0.34, t(286) = 2.77, p = 0.006, 95\% CI [0.27, 1.62] \).

Disclosure statement

No potential conflict of interest was reported by the authors.

ORCID

Bryant Pui Hung Hui http://orcid.org/0000-0003-3063-9297
Aleksandr Kogan http://orcid.org/0000-0003-3166-8786

References


