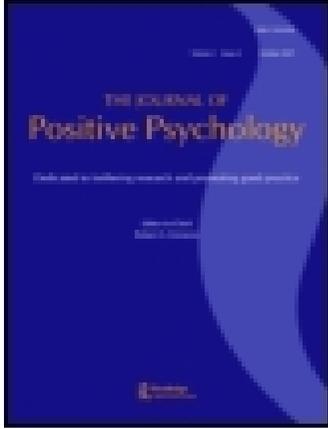


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'It's up to you': Experimentally manipulated autonomy support for prosocial behavior improves well-being in two cultures over six weeks

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Previous research has demonstrated a strong link between prosocial behavior – particularly autonomous prosocial behavior – and well-being. Little is known, however, about whether and how autonomy might be boosted in the context of everyday kindnesses. We tested the effect of supporting students' autonomy on well-being gains from practicing acts of kindness in a six-week randomized experimental study in the United States and South Korea. As predicted, performing kind acts while receiving autonomy support led to greater improvements in well-being than performing kind acts without autonomy support or engaging in comparison activities (i.e. focusing on one's academic work, with or without autonomy support). Notably, these well-being improvements were mediated by feelings of autonomy, competence, and relatedness. The current study is one of the first to demonstrate the causal effect of autonomous prosocial behavior on well-being, as well as the psychological mechanism (i.e. need satisfaction) explaining this effect.

Keywords: autonomy; prosocial behavior; kindness; well-being; happiness; psychological need satisfaction

In their daily lives, people often do small favors or acts of kindness for others. Some of these kind acts are freely chosen and 'from the heart' (e.g. buying a friend a cup of coffee 'just because'), yet other kind acts may be begrudgingly performed out of obligation or in response to a direct request (e.g. giving a friend a ride to the airport). Perhaps not surprisingly, research suggests that prosocial behavior leads to greater improvements in well-being when it is autonomous (Weinstein & Ryan, 2010). Yet, little is known about whether and how it might be possible to boost autonomy in the context of everyday kindnesses.

The present study had three primary aims. First, we tested the role of experimentally manipulated autonomy support in the hedonic rewards of prosocial behavior. Second, we investigated the mediating role of psychological need satisfaction underlying our effects. Finally, our third exploratory aim was to test the generalizability of our findings across two different cultures. Recent evidence indicates that helping others is associated with improvements in well-being across many cultures, suggesting that this effect may be a psychological universal (Aknin et al., 2013; Layous, Lee, Choi, & Lyubomirsky, 2013). Similarly, psychological needs for autonomy, competence, and connectedness are thought to be innate human needs that are cross-culturally relevant (Deci & Ryan, 2000). Finally, prior research indicates that autonomy support can be implemented successfully in

multiple nations (for a review, see Chirkov, 2009). To test whether the underlying mechanisms of the link between prosocial behavior and well-being are similar across cultures, data were collected using samples from both the United States and South Korea.

Prosocial behavior and well-being

Prosocial behavior is an umbrella term encompassing actions to benefit others (Dovidio, Piliavin, Schroeder, & Penner, 2006), including small acts of kindness, such as bringing soup to a friend who is sick, as well as more formal methods of helping, such as volunteering weekly at a local food bank. Throughout this paper, we use the terms prosocial behavior, helping, and kindness interchangeably.

Correlational and experimental evidence reveal a robust relationship between prosocial behavior and subjective well-being (Ellison, 1991; Otake, Shimai, Tanaka-Matsumi, Otsui, & Fredrickson, 2006; Sheldon, Boehm, & Lyubomirsky, 2012; Weinstein & Ryan, 2010; Wheeler, Gorey, & Greenblatt, 1998). For example, daily diary and experience sampling studies show that those who spend more time helping other people (relative to those who spend less time helping) are higher than average in dispositional well-being. In addition, individuals who have great interest in helping others, a tendency to behave in a prosocial manner, and

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intentions to act courteously toward coworkers are relatively more likely to rate themselves as happier (Williams & Shiaw, 1999). Interestingly, a relationship between prosocial behavior and increased well-being has been found not just among psychologically healthy individuals (Thoits & Hewitt, 2001), but also among those who had experienced a recent traumatic event and were presumably in need of help themselves (Frazier et al., 2013).

In addition to this correlational evidence, performing acts of kindness has been shown to boost happiness in givers in randomized controlled studies lasting from one day (Dunn, Aknin, & Norton, 2008) to 10 weeks (Sheldon et al., 2012). For example, in the one-day study, those prompted to spend \$5 or \$20 on others were happier by evening than those prompted to spend the same money on themselves (Dunn et al., 2008), and in a one-week study, those who merely kept track of and recorded their daily number of acts of kindness reported greater increases in happiness compared to a control group (Otake et al., 2006). Overall, both cross-sectional and randomized controlled intervention studies suggest that prosocial behavior is highly effective in improving well-being.

Furthermore, studies that explicitly instruct participants to perform acts of kindness have not only yielded promising results, but have shed light on the conditions that bolster their success. A six-week experiment showed that performing five acts of kindness all in one day led to greater well-being boosts than spreading those five acts out over the course of a whole week (Lyubomirsky, Sheldon, & Schkade, 2005). Thus, the dosage of the activity clearly mattered. In addition, both theoretical and empirical work have shown that people garner greater well-being benefits when they put more effort into their kind acts (Layous, Nelson, & Lyubomirsky, 2014; Lyubomirsky & Layous, 2013). Thus, this research provides evidence for specific factors that influence the magnitude of well-being improvements resulting from performing acts of kindness.

Autonomy support

An additional moderator that may influence the extent to which people obtain hedonic rewards from prosocial behavior is the degree of autonomy they feel. Not surprisingly, people who are free to choose their kind acts demonstrate greater improvements in well-being than those instructed to perform the same acts of kindness every week (Sheldon et al., 2012). In addition, studies have shown that prosocial behavior that is autonomously motivated leads to relatively greater well-being for the helper, as well as for the recipient (Weinstein & Ryan, 2010). Together, this evidence supports the idea that whether a person chooses to commit a kind act – and

precisely how – is an important predictor of the extent to which doing so will make her happy.

To our knowledge, however, researchers have not investigated the process by which autonomy in everyday kindnesses can be increased or how this process influences well-being as it unfolds naturalistically, and over longer periods of time. The current study manipulated both autonomy support and kind acts to test whether performing kind acts while receiving autonomy support will lead to greater improvements in well-being over the course of six weeks than performing kind acts without autonomy support. Autonomy support, defined as communication that promotes autonomous motivation for an activity or behavior (Deci & Ryan, 2000), is a promising approach to magnify the well-being boosts of prosocial behavior. Studies have demonstrated the importance of an autonomy-supportive environment in facilitating positive behavior change or enhanced performance in a variety of domains, including job performance (e.g. Baard, Deci, & Ryan, 2004; Deci, Connell, & Ryan, 1989) and health behavior (e.g. Williams et al., 2009). For example, feeling respected and understood by one's instructor has been found to predict greater academic achievement in students (e.g. Black & Deci, 2000; Deci, Eghrari, Patrick, & Leone, 1994; see Ryan & Brown, 2005, for a review). Despite findings of beneficial impact of autonomy support for positive behavior change, and prosocial behavior in particular (Gagné, 2003), studies have yet to test the role of autonomy support in a longitudinal experiment of prosocial behavior.

Underlying mechanism: psychological need satisfaction

Why would practicing acts of kindness with autonomy support make people happy? Our study also aimed to examine psychological need satisfaction as a mediator of well-being improvements. Self-determination theory posits that human beings have fundamental needs for autonomy (feeling in control of one's actions and behaviors), competence (feeling capable and skilled), and connectedness (feeling close and connected with others; Deci & Ryan, 2000). Notably, the satisfaction of human needs involves a different experience than simply receiving autonomy support. Whereas autonomy support is thought to increase participants' autonomous motivation for prosocial behavior, psychological need satisfaction involves acquiring a psychological nutriment that promotes an overall sense of well-being.

In the current study, we propose that autonomously supported acts of kindness will improve well-being via increases in psychological need satisfaction. Theory suggests that the fulfillment of psychological needs is one mechanism by which simple activities, such as practicing kindness or gratitude, improve well-being (Lyubomirsky

& Layous, 2013). In addition, correlational evidence has shown that autonomy support for prosocial behavior facilitates psychological need satisfaction (Gagné, 2003), and a single-session lab study found that the well-being improvements resulting from autonomously motivated prosocial acts are mediated by increases in need satisfaction (Weinstein & Ryan, 2010). The current study builds on these findings by manipulating both kindness and autonomy support in a longitudinal experiment conducted in two cultures.

Previous research has established the cross-cultural validity of these psychological needs, so we expect that psychological need satisfaction will explain the increases in autonomously supported kind acts among both South Koreans and North Americans. First, and perhaps most self-evident, autonomously supported kind acts facilitate autonomy need satisfaction by highlighting people's sense of choice, initiative, and volition in their daily lives. Second, they will promote competence, as participants have the freedom to select an act of kindness that draws on their strengths and that they feel capable in carrying out. Third, autonomous acts of kindness are likely to engender connectedness because people feel free to engage in a genuine positive interaction with the recipient of their help. In addition, they may choose to do a kind act for someone they already feel close to, further strengthening that relationship.

The current study

A six-week randomized controlled intervention study with US and S. Korean samples investigated whether experimentally manipulated autonomy support influences the efficacy of experimentally manipulated acts of kindness. Our first hypothesis concerned the overall impact of prosocial behavior on well-being. We hypothesized that students prompted to perform acts of kindness would show larger increases in well-being than those prompted to continue doing what they were doing (i.e. focusing on their academic work). Our second – and primary – hypothesis concerned whether participants who performed acts of kindness with autonomy support would benefit the most, relative to the other groups. Specifically, those instructed to do kind acts with autonomy support were expected to show larger increases in well-being than those who did kind acts without autonomy support or those in the control groups. Most positive activities require autonomy, in that people are unlikely to become happier if they feel pushed or coerced to engage in the activities (e.g. Deci & Ryan, 2000). Thus, we hypothesized that autonomy support would bolster the hedonic benefits of doing kindness. Our third hypothesis concerned one mechanism underlying why performing acts of kindness with autonomy support is optimally beneficial. Participants who committed acts of kindness with

autonomy support were expected to experience greater psychological need satisfaction, and, in turn, greater increases in well-being by the end of the experiment.

Method

Participants

Two samples of undergraduate students enrolled in a psychology course participated in this study.

The first group comprised undergraduates attending a diverse, medium-sized public university in the United States ($n = 124$), who completed the study in exchange for course credit. In this group, 20 participants were removed from the sample because they failed to complete measures for at least 5 of the 7 intervention time points or at least 1 of the 3 time points in which measurements of well-being were taken, leaving a total of 104 participants (61% female), ages 17 to 24 ($M_{\text{age}} = 19.11$, $SD = 1.25$). US participants were 45% Asian-American, 32% Latino(a), 9% Caucasian, 4% African-American, 2% Hawaiian/Pacific Islander, and 9% Other/More than one.

The second group comprised undergraduates attending a large public university in South Korea ($n = 153$), who were paid approximately 20US\$. In this group, 39 participants were removed for the same reasons noted above, leaving a total of 114 participants¹ (46% female; 100% Asian), ages 18–27 ($M_{\text{age}} = 20.77$, $SD = 1.86$).

Design

A 2 (autonomy support vs. no autonomy support) \times 2 (intervention activity: acts of kindness vs. control) design was used in this study. Participants were randomly assigned to receive or not receive autonomy support and to perform one of the two activities.

Procedure

The present study took place entirely over the Internet, using a website available only to registered participants. The study website was identical for both samples, except that the website for the UCR sample was written and presented in English and the website for the SNU sample was translated and back-translated into Korean. The total length of the intervention was six weeks.

Baseline assessment

The first week of the intervention period included a consent form, demographic questions, and baseline measures of students' well-being (i.e. life satisfaction, happiness, and positive and negative emotions). Participants also reported their baseline need satisfaction.

Weekly assessments

Assessments of need satisfaction were taken each week of the intervention period. Measurements of life satisfaction, happiness, and positive and negative emotions were taken at the beginning, middle, and end of the intervention period.

Autonomy support manipulation

At the beginning of the study, participants in the autonomy support conditions were told the following cover story:

The purpose of this study is to observe and track the experiences of students who have previously completed this study. These students have volunteered to assist 10 current study participants. You will be assigned to one such previous participant. Beginning this week, you will receive weekly messages from this individual throughout the study.

In reality, these weekly autonomy support messages were prescribed and written using the slang of typical college students to look as if they were from fellow students (see Appendix 1). Autonomy support was provided every week of the intervention. Each week, support messages focused on one of the three ways to satisfy the need for autonomy – namely, providing a rationale, giving a sense of choice, and acknowledging the perspective of participants. Two variations of each of these three autonomy support techniques were used, for a total of six messages. All participants receiving autonomy support (regardless of whether they performed acts of kindness or the control activity) received autonomy support messages in the following randomly determined six-week sequence: Rationale₁, Choice₁, Choice₂, Rationale₂, Acknowledge₁, Acknowledge₂.

Participants in the no autonomy support conditions completed their assigned intervention activities and measures in exactly the same way as participants in the support conditions, except without weekly support messages.

Positive activity manipulation

Performing acts of kindness

In this condition, students were instructed to perform five acts of kindness all in one day, once a week, for six weeks (following Lyubomirsky et al., 2005). At the start of the study, participants received initial instructions about how to begin performing acts of kindness the first week of the intervention so that they could be reported the following week. During each of the remaining five weeks of the intervention period, participants reported on their acts of kindness from the previous

week and continued to complete their assigned activity. Their instructions each week were as follows:

In our daily lives, we all perform acts of kindness for others. These acts may be large or small and the person for whom the act is performed may or may not be aware of the act. Examples include helping your parents cook dinner, doing a chore for your sister or brother, helping a friend with homework, or visiting an elderly relative.

On any day this week, before next Monday, please perform five acts of kindness – all five in one day. The acts do not need to be for the same person, the person may or may not be aware of the act, and the act may or may not be similar to the acts listed above. Next week you will be asked to report what acts of kindness you chose to perform. Please do not perform any acts that may place yourself or others in danger.

Control activity

In this condition, students were instructed to focus on their regularly assigned academic coursework. Parallel to the acts of kindness condition, participants in this condition were also instructed to report what they did to focus on their academic work. This particular activity was chosen because it was both naturalistic and relatively more conducive toward the provision of autonomy support (e.g. Black & Deci, 2000). Indeed, relative to giving support for the more challenging task of completing academic coursework, giving autonomy support for the type of neutral control activity used in previous studies (e.g. asking participants to list the things they did during the past week) is likely to be awkward or inappropriate. Furthermore, although providing autonomy support for completing academic coursework could raise participants' grades, it is not likely to make them happier (Black & Deci, 2000).

Materials

Happiness

Participants' overall happiness was assessed with the Subjective Happiness Scale (Lyubomirsky & Lepper, 1999). All items are rated on a 7-point Likert-type scale. The first two items ask participants how generally happy they are (1 = *not a very happy person*, 7 = *a very happy person*) and how happy they are relative to their peers (1 = *less happy*, 7 = *more happy*). The third and fourth items require participants to indicate the extent to which a description of a 'very happy' and a 'not very happy' person characterizes them (1 = *not at all*, 7 = *a great deal*). An average was computed, with higher scores on this measure indicating greater subjective happiness. Reliability of this measure ranged from $\alpha = 0.86$ to $\alpha = 0.88$ throughout the study.

Life satisfaction

To assess life satisfaction, participants completed the Satisfaction With Life Scale (SWLS; Diener, Emmons, Larsen, & Griffin, 1985). The SWLS consists of five items (e.g. 'In most ways my life is close to my ideal') rated on a 7-point scale (1 = *strongly disagree*, 7 = *strongly agree*). Cronbach's α 's ranged from 0.86 to 0.87 throughout the study.

Emotions

The Modified Differential Emotions Scale (Fredrickson, Cohn, Coffey, Pek, & Finkel, 2008) requires participants to recall and rate their strongest experience of 20 different emotions over a specific period of time (i.e. the past week) on a 4-point scale (0 = *not at all*, 4 = *extremely*). The scale includes a subscale for positive emotions (e.g. amusement, compassion, confidence) and a subscale for negative emotions (e.g. anger, sadness, contempt). Across measurements in this study, α 's for positive emotions ranged from 0.90 to 0.92, while α 's for negative emotions ranged from 0.80 to 0.88.

Psychological need satisfaction

Psychological need satisfaction was assessed with nine items, three representing autonomy (e.g. 'I felt that my choices were based on my true interests and values'), three representing connectedness (e.g. 'I felt a sense of contact with people who care for me, and whom I care for'), and three representing competence (e.g. 'I felt that I was taking on and mastering hard challenges'; Sheldon, Elliot, Kim, & Kasser, 2001). Participants rated the extent to which they agreed with each statement on 7-point scale (1 = *not at all*, 7 = *very much*). Results were analyzed by combining all nine items into a 'need satisfaction' composite (α 's ranging from 0.90 to 0.94

throughout the study), as well as by examining autonomy (α 's ranging from 0.82 to 0.90), connectedness (α 's ranging from 0.82 to 0.90), and competence (α 's ranging from 0.83 to 0.90) separately.

Suspicious

To establish whether participants believed that support messages were provided by a peer (rather than the experimenter), one open-ended question ('Did you have any suspicions about this study?') was administered at the end of the study.

Results

Overview of analyses

To determine whether baseline condition differences existed prior to the manipulation, a multivariate analysis of variance was performed. As expected, the four groups did not differ in subjective happiness, life satisfaction, negative affect, or positive affect at the beginning of the study, $F(15, 574.60) = 0.93$, $p = 0.53$, Wilks' $\Lambda = 0.94$. In addition, responses to the open-ended question did not reveal any suspicions, indicating no skepticism by participants that anyone else but a fellow student wrote the weekly support messages. Finally, all participants who completed well-being measures each week also reported their acts of kindness, confirming that participants followed our instructions for the kindness manipulation. The majority of students' kindnesses included acts for their friends, classmates, and family members, such as buying a friend a cup of coffee, helping a classmate study for an exam, or assisting an elderly family member with household chores.

Exploratory analyses revealed that changes in negative emotions, subjective happiness, and life

Table 1. Means (SDs) for well-being outcomes by condition.

		Week 1 Mean (SD)	Week 4 Mean (SD)	Week 7 Mean (SD)
Subjective happiness	Kindness support	5.11 (1.18)	5.21 (1.27)	5.26 (1.23)
	Kindness no support	5.05 (0.94)	5.21 (0.96)	4.90 (0.94)
	Control support	5.16 (1.09)	5.18 (1.18)	5.03 (1.26)
	Control no support	4.95 (1.20)	4.97 (1.21)	4.90 (1.31)
Life satisfaction	Kindness support	4.57 (1.11)	4.54 (1.07)	4.71 (1.14)
	Kindness no support	4.49 (1.03)	4.72 (1.04)	4.66 (1.13)
	Control support	4.57 (1.28)	4.40 (1.29)	4.53 (1.33)
	Control no support	4.43 (1.37)	4.42 (1.42)	4.50 (1.45)
Positive emotions	Kindness support	2.52 (0.58)	2.36 (0.70)	2.27 (0.78)
	Kindness no support	2.50 (0.59)	2.39 (0.59)	2.36 (0.66)
	Control support	2.63 (0.66)	2.36 (0.77)	2.44 (0.73)
	Control no support	2.38 (0.79)	2.32 (0.71)	2.18 (0.77)
Negative emotions	Kindness support	1.10 (0.48)	0.97 (0.54)	0.84 (0.64)
	Kindness no support	1.29 (0.63)	1.24 (0.77)	1.38 (0.78)
	Control support	1.28 (0.58)	1.34 (0.63)	1.25 (0.64)
	Control no support	1.38 (0.63)	1.29 (0.68)	1.29 (0.70)

satisfaction each followed a similar pattern (see Table 1). Accordingly, we created a composite of well-being with these components to reflect the affective and cognitive aspects of subjective well-being. Because positive emotions did not follow this overall pattern, changes in positive emotions were analyzed in separate models.

To assess shifts in well-being over time between and within individuals, we employed multilevel growth modeling techniques (Singer & Willett, 2003). Exploratory analyses revealed that changes in well-being in this study may be nonlinear (see Table 1). Thus, we tested both linear and quadratic changes over time. We began with unconditional models, specifying both linear and quadratic changes in well-being across the three time points. The unconditional quadratic growth model was a better-fitting model for well-being, $\Delta\chi^2(4) = 31.21$, $p < 0.0001$, but not for positive emotions, $\Delta\chi^2(4) = 1.96$, $p = 0.74$. Accordingly, we compare all hypothesis-testing models for well-being and positive emotions to the unconditional quadratic growth model and to the unconditional linear growth model, respectively.

Time was centered around the second time point (intervention midpoint) to reduce collinearity between the linear and quadratic components (Singer & Willett, 2003). A variable representing culture (dummy coded, S.

Korea = 1) was entered as a between-subjects predictor. To test our specific hypotheses, variables representing each condition (dummy-coded) were entered as between-subjects predictors.

Hypothesis 1: well-being benefits of performing acts of kindness overall

We began with models comparing the overall effectiveness of practicing kindness to a control activity (Table 2). Interestingly, these effects were moderated by culture. S. Koreans who performed acts of kindness demonstrated marginal linear increases in well-being, relative to those who focused on their academic work, $\gamma_{13} = 0.16$, $SE = 0.09$, $t(374) = 1.86$, $p = 0.06$, $d = 0.82$, whereas US participants did not, $\gamma_{11} = -0.02$, $SE = 0.06$, $t(374) = -0.30$, $p = 0.77$, $d = -0.10$. By contrast, US participants who practiced kindness demonstrated significant nonlinear changes in well-being, relative to controls, $\gamma_{21} = -0.16$, $SE = 0.08$, $t(374) = -1.98$, $p = 0.05$, whereas S. Korean participants did not, $\gamma_{23} = 0.09$, $SE = 0.12$, $t(374) = 0.78$, $p = 0.44$.

Performing acts of kindness was not associated with improvements in positive emotions for either cultural group, $\gamma_s < 0.11$, $p_s > 0.22$.

Table 2. Model parameters (standard errors) and goodness of fit for linear and quadratic changes in well-being by kindness conditions and culture (Hypothesis 1).

	Effect	Parameter	Model 1: unconditional quadratic growth	Model 2: kindness vs. control by culture
<i>Fixed effects</i>				
Status at mid-intervention, π_{0i}	Intercept	γ_{00}	0.32*** (0.05)	0.45*** (0.10)
	Kindness	γ_{01}		0.09 (0.15)
	Culture	γ_{02}		-0.41** (0.14)
	Kindness × Culture	γ_{03}		0.17 (0.21)
Linear rate of change, π_{1i}	Time	γ_{10}	0.16*** (0.02)	0.23*** (0.04)
	Kindness	γ_{11}		-0.02 (0.06)
	Culture	γ_{12}		-0.21*** (0.06)
	Kindness × Culture	γ_{13}		0.16+ (0.09)
Quadratic rate of change, π_{2i}	Time ²	γ_{20}	-0.16*** (0.03)	-0.12* (0.06)
	Kindness	γ_{21}		-0.16* (0.08)
	Culture	γ_{22}		0.17 (0.21)
	Kindness × Culture	γ_{23}		0.09 (0.12)
<i>Goodness-of-fit</i>				
	Deviance	1036.26		1005.18
	$\Delta\chi^2$			31.07***
	Δdf			9

Note: In Model 1, the intercept parameter estimate (γ_{00}) represents the average WB score at Week 4 across the sample. In all models, the intercept, linear slope (Time), and quadratic slope (Time²) were free to vary.
+ $p < 0.10$; * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$. (All p -values in this table are two-tailed.)

Hypothesis 2: well-being benefits of performing acts of kindness with autonomy support

We tested our hypotheses regarding the well-being benefits of performing acts of kindness with autonomy support in three models by rotating the reference group to compare the acts of kindness with autonomy support condition with each of the other three conditions. Performing acts of kindness with autonomy support led to greater linear improvements in well-being relative to performing acts of kindness without autonomy support, $\gamma_{11} = 0.15$, $SE = 0.06$, $t(373) = 2.42$, $p = 0.02$, $d = 0.77$, relative to practicing a control activity with autonomy support, $\gamma_{11} = 0.13$, $SE = 0.06$, $t(373) = 2.10$, $p = 0.04$, $d = 0.67$, and finally, relative to practicing a control activity without autonomy support, $\gamma_{11} = 0.13$, $SE = 0.06$, $t(373) = 2.14$, $p = 0.03$, $d = 0.67$ (see Table 3, Figure 1). Performing acts of kindness with autonomy support did not vary by culture, and it did not lead to significant nonlinear changes in well-being for either cultural group. Linear and nonlinear changes in well-being in the kindness without support, control with support, and control without support conditions did not significantly differ from one another, $\gamma_s < 0.01$, $p_s > 0.89$.

Practicing kindness with autonomy support did not lead to greater improvements in positive emotions for either culture, relative to practicing kindness without support, or to either of the control conditions, $\gamma_s < -0.04$, $p_s > 0.39$.

Hypothesis 3: the mediational role of need satisfaction

Our third hypothesis explored whether the effect of autonomy-supported kind acts on well-being was mediated by increases in need satisfaction. We began by examining in multilevel growth analyses whether doing acts of kindness with autonomy support led to improvements in need satisfaction. For both cultures, practicing kindness with autonomy support led to greater improvements in need satisfaction than practicing a control activity without autonomy support, $\gamma_{11} = 0.08$, $SE = 0.03$, $t(1175) = 2.34$, $p = 0.02$, $d = 0.64$, but it did not differ from practicing kindness without autonomy support or from practicing a control activity with support, $\gamma_s < 0.06$, $p_s > 0.12$, $d_s < 0.48$ (Table 4).

Next, using Preacher and Hayes' (2008) recommended procedures, we estimated path coefficients, as well as bootstrap bias-corrected confidence intervals (with 5000 bootstrapped samples) for the indirect effects of kindness with autonomy support on well-being at posttest through need satisfaction (averaged across Week 2–6) compared to the other conditions, as well as for baseline well-being and baseline need satisfaction. Because performing acts of kindness with autonomy support did not result in improvements in positive emotions, these analyses focus solely on our well-being composite.

We first tested these mediation models separately by culture, and the indirect effect of kindness with autonomy support in the two cultures did not significantly differ from one another (as demonstrated by the overlapping confidence intervals [CIs] for the two cultures: US $[-0.01, 0.25]$, S. Korea $[0.03, 0.36]$). Accordingly, all subsequent mediation models were collapsed across culture.

Consistent with our multilevel growth analyses, the direct effect of autonomy-supported kindness on need satisfaction was significant (a path), $b = 0.32$, $p = 0.02$, as was the direct effect of need satisfaction on well-being (b path), $b = 0.33$, $p < 0.0001$. Furthermore, the bias-corrected 95% confidence interval for the indirect effect of autonomy-supported kindness through need satisfaction did not contain zero $[0.02, 0.23]$. The path from autonomy-supported kindness was significant in the unmediated model (c path), $b = 0.28$, $p = 0.02$, and it dropped below significance when the mediators were entered into the model (c' path), $b = 0.17$, $p = 0.13$, suggesting that the relationship between autonomy-supported kindness and improvements in well-being is partially mediated by increases in need satisfaction. The indirect effects for each of the other conditions were not significant. Consistent with our multilevel growth analyses, the paths from kindness without support and control with support to improvements in well-being (c paths) were not significant, $|b_s| < 0.05$, $p_s > 0.71$, and the bias-corrected confidence intervals included zero. Together, these mediation analyses suggest that performing acts of kindness with autonomy support uniquely increases well-being by improving the satisfaction of psychological needs.

Alternative hypotheses

Next, we tested additional mediation models to rule out two alternative hypotheses. First, to determine whether the indirect effects of need satisfaction were being driven specifically by either autonomy, connectedness, or competence, we conducted our mediation analyses separately for each need. Autonomy $[0.01, 0.20]$, connectedness $[0.01, 0.22]$, and competence $[0.02, 0.19]$ each independently mediated the effects of autonomy-supported kindness on improvements in well-being. We also tested a multiple mediation model with autonomy, connectedness, and competence each entered independently, rather than as a composite variable. In this model, neither autonomy $[-0.01, 0.14]$, connectedness $[-0.002, 0.13]$, nor competence $[-0.02, 0.14]$ mediated the effect of kindness with autonomy support on well-being improvements, independent of the other needs, but the total indirect effect of all three needs together remained significant $[0.02, 0.22]$.

Second, we tested the alternative hypothesis that need satisfaction would mediate the association between kindness in general (i.e. with or without autonomy

Table 3. Model parameters (standard errors) and goodness of fit for linear and quadratic changes in well-being by kindness support conditions (Hypothesis 2).

Effect	Parameter	Model 2: kindness support		Model 3: kindness support		Model 4: kindness support	
		vs. control no support	support	vs. control no support	support	vs. kindness no support	support
<i>Fixed effects</i>							
Status at mid-intervention, π_{0i}	Intercept		γ_{00}				
	Kindness support		γ_{01}				
	Kindness no support		γ_{02}				
Linear rate of change, π_{1i}	Control support		γ_{03}				
	Control no support						
	Culture						
Quadratic rate of change, π_{2i}	Time		γ_{10}				
	Kindness support		γ_{11}				
	Kindness no support		γ_{12}				
Goodness-of-fit	Control support		γ_{13}				
	Control no support						
	Culture						
Deviance	Time ²		γ_{20}				
	Kindness support		γ_{21}				
	Kindness no support		γ_{22}				
Delta chi-squared	Control support		γ_{23}				
	Control no support						
	Culture						
Delta df	Deviance						
	Delta chi-squared						
	Delta df						

Notes: Analyses of the full model also included culture as a predictor of nonlinear change and as a moderator of the effects of each condition on linear and nonlinear change. Because culture did not significantly predict nonlinear change or moderate the effects of the conditions ($|ps| < 0.22$, $ps > 0.14$), we created a simplified model including culture as a predictor of intercept and linear changes in well-being, which did not significantly worsen model fit, $\Delta\chi^2(10) = 9.78$, $p = 0.46$. In Model 2, the reference group is Control No Support; in Model 3, the reference group is Kindness No Support; and in Model 4, the reference group is Kindness No Support. In all models, the intercept, linear slope (Time), and quadratic slope (Time²) were free to vary.

+ $p < 0.10$; * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$. (All p -values in this table are two-tailed.)

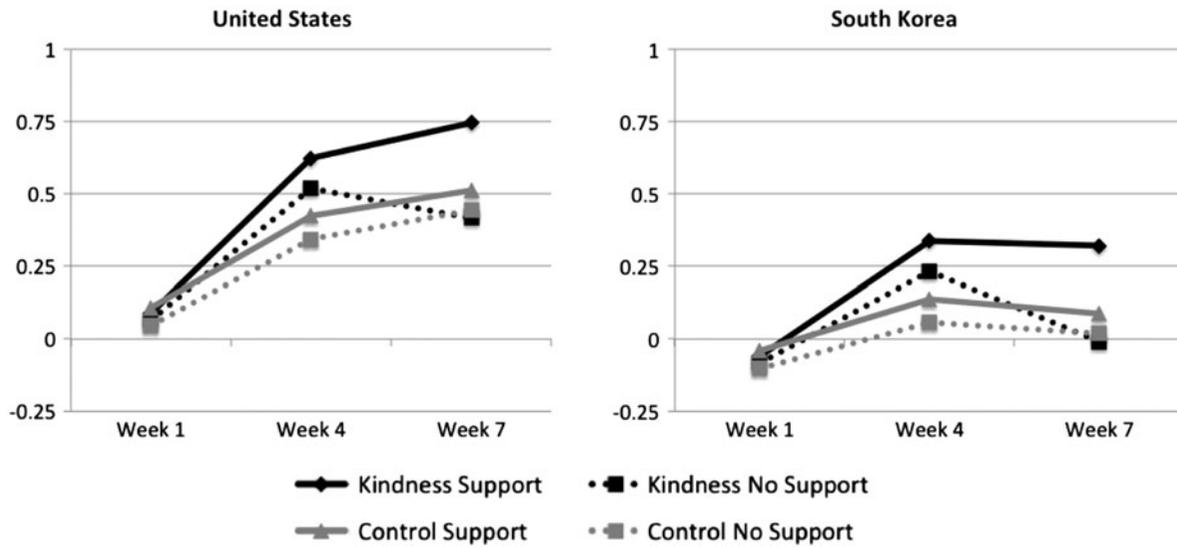


Figure 1. Changes in well-being by condition for US (left panel) and S. Korean (right panel) participants.

Table 4. Model parameters (standard errors) and goodness of fit for linear and quadratic changes in well-being by kindness support conditions (Hypothesis 3).

Effect	Parameter	Model 1: unconditional quadratic growth	Model 2: Kindness support vs. Control no support
<i>Fixed effects</i>			
Status at mid-intervention, π_{0i}	Intercept	4.86*** (0.06)	5.06*** (0.13)
	Kindness support		0.19 (0.17)
	Kindness no support		0.18 (0.17)
	Control support		0.26 (0.16)
Linear rate of change, π_{1i}	Culture		-0.69*** (0.11)
	Time	-0.02 (0.02)	-0.05+ (0.03)
	Kindness support		0.08* (0.03)
	Kindness no support		0.02 (0.03)
Quadratic rate of change, π_{2i}	Control support		0.03 (0.03)
	Time ²	0.005 (0.004)	0.005 (0.11)
<i>Goodness-of-fit</i>			
Deviance		3143.52	3098.74
$\Delta\chi^2$			44.78***
Δdf			7

Notes: Analyses of the full model also included culture as a predictor of nonlinear change and as a moderator of the effects of each condition on linear change. The full model also included each condition as a predictor of nonlinear change. Because these variables were not significant predictors in the full model, ($|p| < 0.19$, $p > 0.37$), we created a simplified model without these predictors, which did not significantly worsen model fit, $\Delta\chi^2(14) = 7.20$, $p = 0.93$.

In all models, the intercept, linear slope (Time), and quadratic slope (Time²) were free to vary.
+ $p < 0.10$; * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$. (All p -values in this table are two-tailed.)

support) and improvements in well-being by collapsing across the two kindness conditions and the two control conditions. The indirect effect of need satisfaction in this model was not significant $[-0.01, 0.13]$, suggesting that our mediator is unique to autonomy-supported kindness, rather than kindness in general.

Discussion

Our study – conducted in both the US and S. Korea – is the first, to our knowledge, to demonstrate the feasibility of experimentally manipulating autonomy support for prosocial behavior over multiple weeks, providing evidence that obligatory acts of kindness most effectively improve well-being when people feel autonomous in performing these acts. Although the rewards of kindness in general differed across cultures, these cultural differences disappeared after considering the role of autonomy support. Moreover, our findings revealed one mechanism for why being generous to others, with encouragement to act freely, makes people happy – namely, feeling competent, connected, and autonomous. Notably, these findings remained consistent across two very different cultures, highlighting the broad importance of choice and need satisfaction to the pursuit of well-being.

The benefits of prosocial behavior with autonomy support

Our primary hypothesis was that performing acts of kindness with autonomy support would yield greater increases in well-being than performing acts of kindness without autonomy support or completing regularly assigned academic work (with or without autonomy support). As described above, our study, which included experimental manipulations of both autonomy support and kindness in two cultures, is among the first to demonstrate the causal effects of autonomy-supported prosocial behavior on well-being. These findings are consistent with work showing that people demonstrate the largest boosts in well-being when their prosocial behaviors are autonomously motivated (Weinstein & Ryan, 2010), and that people who engage in happiness-boosting activities with a high degree of self-concordance (which taps autonomous motivation) benefit more than those with low self-concordance (Sheldon & Lyubomirsky, 2006). Interestingly, our study revealed that participants who performed acts of kindness without autonomy support demonstrated nonlinear change in well-being, whereby their well-being gains tapered over time. By contrast, participants who performed acts of kindness with autonomy support did not show this pattern, but continued to demonstrate increases in well-being throughout the study. Analyses using subjective

happiness, life satisfaction, and negative affect as outcome variables supported this hypothesis, but analyses using positive affect as an outcome were not significant.

This mixed pattern of results is not surprising, as positive and negative affect represent two independent components of subjective well-being (Russell & Carroll, 1999). Indeed, previous research shows that, rather than operating as opposing constructs, positive and negative affect correlate with other variables differently (e.g. Watson & Pennebaker, 1989). In addition, positive affect may not have increased due to the context of the current study. Performing acts of kindness may not lead participants to feel joyful, happy, excited, and content in the moment, as it involves planning, expending energy and resources, and sometimes even drudgery, as well as adding another item to students' ever-growing to-do lists. By contrast, a participant is likely to experience improvements in global well-being and diminution of negative emotions as he begins to view himself as a kind person. In sum, the present study demonstrates how prosocial behavior – when experienced as choiceful – can result in improvements in some, but not all, components of well-being.

Notably, the overall impact of prosocial behavior (collapsing over autonomy support) on well-being was relatively weak and differed by culture. Overall, doing acts of kindness improved well-being among S. Koreans, but not among North Americans. Given the stressful academic climate in S. Korea (Lee & Larson, 2000), one possibility is that focusing on academic work was less positive among S. Korean students than among US students (see Figure 1), which resulted in a larger difference between the kindness and control groups among S. Koreans students than among US students. In addition, previous research using US participants has demonstrated that kind acts can actually reduce well-being when they are not performed autonomously (Weinstein & Ryan, 2010). Thus, when collapsing across the two kindness conditions, the overall effect of kindness may have been weakened, and when comparing to a relatively more positive control condition in the US, the overall effects of kindness among US participants disappeared. Moreover, our results revealed an overall positive trend across conditions, which may be due to the academic successes participants in the control condition may have experienced as a result of focusing on schoolwork.

The mediating role of need satisfaction

Our final hypothesis explored why people who performed autonomously supported acts of kindness benefited the most. Our results suggest that they experienced the biggest increases in happiness and life satisfaction,

and the biggest reductions in negative emotions, in part because their behavior triggered boosts in need satisfaction. Specifically, if, while doing kind acts while receiving autonomy support, participants felt more autonomous (e.g. 'I chose to help my roommate with his paper'), more competent (e.g. 'I understand the topic better now after teaching it'), and more connected to others (e.g. 'I feel closer to him now'), they were more likely to enjoy greater well-being. These results are buttressed by the strong theoretical link between need satisfaction and well-being (Deci & Ryan, 2000).

Caveats and limitations

The results of the current study should be considered in light of several limitations. Consistent with previous research (e.g. Deci et al., 1989; Ryan, Patrick, Deci, & William, 2008), participants either received autonomy supportive messages or no messages. In future studies, a second control group could help determine the strength of autonomy support compared to social support without an autonomy component. In this group, participants would receive messages that reflect pure social support, rather than autonomy support to parse out the effects of autonomy from that of general supportiveness'.

Additionally, the success of autonomy support may have been contingent on whether participants believed that the weekly messages were coming from peers. This method of providing autonomy support via prescribed electronic messages should be tested using messages ostensibly sent by the experimenter or a comparable authority figure. Indeed, previous research shows that autonomy support (offered in person) is effective when given by teachers (e.g. Jang, Reeve, & Deci, 2010), workplace supervisors (e.g. Deci et al., 1989, 2001), and athletic coaches (Adie, Duda, & Ntoumanis, 2008). If similar results are found when autonomy support is rendered by an authority figure via electronic messages, they will provide an empirical foundation for professionals in applied settings to use this technique without the impractical concern of whether or not participants believe the source of the messages. Finally, although the autonomy support messages for the kindness condition included persuasive communications, so did the messages we crafted for the control condition. Furthermore, providing a rationale is a key element of autonomy support (Reeve, Hyungshim, Hardre, & Omura, 2002). Accordingly, future investigators may need to examine the unique effects of the differential elements of autonomy support (providing a rationale, giving a sense of choice, and acknowledging the perspective of participants) to explore whether or not effective messages require persuasive content.

Autonomy support, novel manipulations, and culture: implications, applications, and conclusions

The results of this study elucidate the importance of autonomy support for performing acts of kindness, which are applicable to both basic and applied research settings. A large number of self-determination theory-based intervention studies have spotlighted the effectiveness of autonomy support in fostering positive behavior change and enhancing work performance (e.g. Fortier, Sweet, O'Sullivan, & Williams, 2007; Ryan, Williams, Patrick, & Deci, 2009). Although past studies have demonstrated the relevance of autonomy support and autonomous motivation for prosocial behavior (Gagné, 2003; Weinstein & Ryan, 2010), to our knowledge, ours is the first to test these questions in a longitudinal framework and for naturalistic kind acts that people perform in their daily lives.

Furthermore, our results indicate that autonomy support, delivered via prescribed, electronic messages, can be administered in an easy, inexpensive, brief, and uniform manner, applicable to a wide range of activities. The novel autonomy support manipulation developed for the present study can be used by researchers to refine autonomy support techniques and further explore the effects of these techniques on different types of happiness-increasing and self-improvement practices.

Notably, the results suggest that autonomy support for kind acts is relevant in more than one culture. As described above, autonomously supported acts of kindness led to boosts in well-being in both the US and S. Korea. Consistent with this finding, previous research has demonstrated the effectiveness of perceived autonomy support in facilitating desirable behavior change among students in a variety of cultures (see Chirkov, 2009, for a review). Furthermore, our results are directly supported by a previous study that showed that self-concordant goals, which largely tap autonomous motivation, were reported as frequently by Asian participants (including South Koreans) as they were by US participants (Sheldon et al., 2004). Thus, the provision of autonomy support appears to be a good fit for members of both Eastern and Western cultures, perhaps because the drive to autonomously pursue goals is universal.

These findings are also consistent with recent evidence that the well-being boosting effects of prosocial behavior may be psychological universal (Aknin et al., 2013). Moreover, our findings suggest that this universal operates via a similar mechanism in these two cultures – namely, by satisfying people's needs for autonomy, competence, and connectedness. To further explore the cross-cultural generalizability of these findings, investigators could test the effectiveness of autonomously supported kindness in a variety of cultures and subcultures,

while simultaneously testing potential similarities and differences in the mechanisms behind the activities' success.

Finally, results from the present study and future work that builds on it will not only extend research on prosocial behavior, but also benefit individuals wishing to perform kind acts (or instruct others to do so) in clinical (e.g. mental health) and non-clinical (e.g. business, educational, government, athletic) settings. For example, many educational institutions, from middle schools to colleges, now require students to engage in volunteer work to receive their degrees. Our findings suggests that these institutions may be particularly interested in supporting their students' autonomy in these requirements to ensure that their volunteer activities are maximally hedonically rewarding, and thus presumably predictive of future generosity and service. Similarly, in both individualist and collectivist societies, many circumstances in daily life compel people to ask for favors or assistance, from rides to the airport or moving a sofa to daily caregiving or charitable gifts. Our work suggests that when askers acknowledge the benefactor's perspective, and provide a rationale and sense of choice in their appeal, they will be met with greater willingness and joy.

Note

1. We compared baseline well-being of those who were removed due to missing data to those who were retained. In the UCR sample, the groups did not significantly differ on subjective happiness, life satisfaction, negative affect, positive affect, or psychological need satisfaction, $F(5, 120) = 0.54, p = 0.74, \text{Wilks}' \Lambda = 0.98$. In the SNU sample, the two groups did not significantly differ in happiness, life satisfaction, negative affect, positive affect, or psychological need satisfaction, $F(4, 131) = 1.45, p = 0.22, \text{Wilks}' \Lambda = 0.96$.

References

- Adie, J., Duda, J. L., & Ntoumanis, N. (2008). Autonomy support, basic need satisfaction and the optimal functioning of adult male and female sport participants: A test of basic needs theory. *Motivation and Emotion, 32*, 189–199. doi:10.1007/s11031-008-9095-z
- Aknin, L. B., Barrington-Leigh, C. P., Dunn, E. W., Helliwell, J. F., Burns, J., Biswas-Diener, R., ... Norton, M. I. (2013). Prosocial spending and well-being: Cross-cultural evidence for a psychological universal. *Journal of Personality and Social Psychology, 104*, 635–652. doi:10.1037/a0031578
- Baard, P. P., Deci, E. L., & Ryan, R. M. (2004). Intrinsic need satisfaction: A motivational basis of performance and well-being in two work settings. *Journal of Applied Social Psychology, 34*, 2045–2068. doi:10.1111/j.1559-1816.2004.tb02690.x
- Black, A. E., & Deci, E. L. (2000). The effects of instructors' autonomy support and students' autonomous motivation on learning organic chemistry: A self-determination theory perspective. *Science & Education, 84*, 740–756. doi:10.1002/1098-237X(200011)84:6<740:AID-SCE4>3.0.CO;2-3
- Chirkov, V. I. (2009). A cross-cultural analysis of autonomy in education: A self-determination theory perspective. *Theory and Research in Education, 7*, 253–262. doi:10.1177/1477878509104330
- Deci, E. L., Connell, J. P., & Ryan, R. M. (1989). Self-determination in a work organization. *Journal of Applied Psychology, 74*, 580–590. doi:10.1037/0021-9010.74.4.580
- Deci, E. L., Eghrari, H., Patrick, B. C., & Leone, D. (1994). Facilitating internalization: The self-determination theory perspective. *Journal of Personality, 62*, 119–142. doi:10.1111/j.1467-6494.1994.tb00797.x
- Deci, E. L., & Ryan, R. M. (2000). The 'what' and 'why' of goal pursuits: Human needs and the self-determination of behavior. *Psychological Inquiry, 11*, 227–268. doi:10.1207/S15327965PLI1104_01
- Deci, E. L., Ryan, R. M., Gagne, M., Leone, D. R., Usunov, J., & Kornazheva, B. P. (2001). Need satisfaction, motivation, and well-being in the work organizations of a former eastern bloc country: A cross-cultural study of self-determination. *Personality and Social Psychology Bulletin, 27*, 930–942. doi:10.1177/0146167201278002
- Diener, E., Emmons, R. A., Larsen, R. J., & Griffin, S. (1985). The satisfaction with life scale. *Journal of Personality Assessment, 49*, 71–75. doi:10.1207/s15327752jpa4901_13
- Dovidio, J. F., Piliavin, J. A., Schroeder, D. A., & Penner, L. A. (2006). *The social psychology of prosocial behavior*. Mahwah, NJ: Erlbaum.
- Dunn, E. W., Aknin, L. B., & Norton, M. I. (2008). Spending money on others promotes happiness. *Science, 319*, 1687–1688. doi:10.1126/science.1150952
- Ellison, C. (1991). Religious involvement and subjective well-being. *Journal of Health and Social Behavior, 32*, 80–99.
- Fortier, M. S., Sweet, S. N., O'Sullivan, T. L., & Williams, G. C. (2007). A self-determination process model of physical activity adoption in the context of a randomized controlled trial. *Psychology of Sport and Exercise, 8*, 741–757. doi:10.1016/j.psychsport.2006.10.006
- Frazier, P., Greer, C., Gabrielsen, S., Tennen, H., Park, C., & Tomich, P. (2013). The relation between trauma exposure and prosocial behavior. *Psychological Trauma: Theory, Research, Practice, and Policy, 5*, 286–294. doi:10.1037/a0027255
- Fredrickson, B. L., Cohn, M. A., Coffey, K. A., Pek, J., & Finkel, S. M. (2008). Open hearts build lives: Positive emotions, induced through loving-kindness meditation, build consequential personal resources. *Journal of Personality and Social Psychology, 95*, 1045–1062. doi:10.1037/a0013262
- Gagné, M. (2003). The role of autonomy support and autonomy orientation in prosocial behavior engagement. *Motivation and Emotion, 27*, 199–223.
- Jang, H., Reeve, J., & Deci, E. L. (2010). Engaging students in learning activities: It is not autonomy support or structure, but autonomy support and structure. *Journal of Educational Psychology, 102*, 588–600. doi:10.1037/a0019682
- Layous, K., Lee, H., Choi, I., & Lyubomirsky, S. (2013). Culture matters when designing a successful happiness-increasing activity: A comparison of the United States and South Korea. *Journal of Cross-Cultural Psychology, 44*, 1294–1303. doi:10.1177/0022022113487591
- Layous, K., Nelson, S. K., & Lyubomirsky, S. (2014). *Gratitude as a trigger of self-improvement efforts*. Manuscript in preparation.

- Lee, M., & Larson, R. (2000). The Korean 'examination hell': Long hours of studying, distress, and depression. *Journal of Youth and Adolescence*, 29, 249–271.
- Lyubomirsky, S., & Layous, K. (2013). How do simple positive activities increase well-being? *Current Directions in Psychological Science*, 22, 57–62. doi:10.1177/0963721412469809
- Lyubomirsky, S., & Lepper, H. S. (1999). A measure of subjective happiness: Preliminary reliability and construct validation. *Social Indicators Research*, 46, 137–155.
- Lyubomirsky, S., Sheldon, K. M., & Schkade, D. (2005). Pursuing happiness: The architecture of sustainable change. *Review of General Psychology*, 9, 111–131. doi:10.1037/1089-2680.9.2.111
- Otake, K., Shimai, S., Tanaka-Matsumi, J., Otsui, K., & Fredrickson, B. L. (2006). Happy people become happier through kindness: A counting kindnesses intervention. *Journal of Happiness Studies*, 7, 361–375. doi:10.1007/s10902-005-3650-z
- Preacher, K. J., & Hayes, A. F. (2008). Asymptotic and resampling strategies for assessing and comparing indirect effects in multiple mediator models. *Behavior Research Methods*, 40, 879–891. doi:10.3758/BRM.40.3.879
- Reeve, J., Hyungshim, J., Hardre, P., & Omura, M. (2002). Providing a rationale in an autonomy-supportive way as a strategy to motivate others during an uninteresting activity. *Motivation & Emotion*, 26, 183–207. doi:10.1023/A:1021711629417
- Russell, J. A., & Carroll, J. M. (1999). On the bipolarity of positive and negative affect. *Psychological Bulletin*, 125, 3–30. doi:10.1037/0033-2909.125.1.3
- Ryan, R. M., & Brown, K. W. (2005). Legislating competence: The motivational impact of high stakes testing as an educational reform. In A. E. Elliot & C. Dweck (Eds.), *Handbook of competence* (pp. 354–374). New York, NY: Guilford Press.
- Ryan, R. M., Patrick, H., Deci, E. L., & Williams, G. C. (2008). Facilitating health behaviour change and its maintenance: Interventions based on self-determination theory. *The European Health Psychologist*, 10, 2–5.
- Ryan, R. M., Williams, G. C., Patrick, H., & Deci, E. L. (2009). Self-determination theory and physical activity: The dynamics of motivation in development and wellness. *Hellenic Journal of Psychology*, 6, 107–124.
- Sheldon, K. M., Boehm, J. K., & Lyubomirsky, S. (2012). Variety is the spice of happiness: The hedonic adaptation prevention (HAP) model. In I. Boniwell & S. David (Eds.), *Oxford handbook of happiness* (pp. 901–914). Oxford: Oxford University Press.
- Sheldon, K. M., Elliot, A. J., Kim, Y., & Kasser, T. (2001). What is satisfying about satisfying events? Testing 10 candidate psychological needs. *Journal of Personality and Social Psychology*, 80, 325–339. doi:10.1037/0022-3514.80.2.325
- Sheldon, K. M., Elliot, A. J., Ryan, R. M., Chirkov, V. I., Kim, Y., Wu, C., ... Sun, Z. (2004). Self-concordance and subjective well-being in four cultures. *Journal of Cross-Cultural Psychology*, 35, 209–223. doi:10.1177/0022022103262245
- Sheldon, K. M., & Lyubomirsky, S. (2006). How to increase and sustain positive emotion: The effects of expressing gratitude and visualizing best possible selves. *The Journal of Positive Psychology*, 1, 73–82. doi:10.1080/17439760500510676
- Singer, J. D., & Willett, J. B. (2003). *Applied longitudinal data analysis*. Oxford: Oxford University Press.
- Thoits, P. A., & Hewitt, L. N. (2001). Volunteer work and well-being. *Journal of Health and Social Behavior*, 42, 115–131.
- Watson, D., & Pennebaker, J. W. (1989). Health complaints, stress, and distress: Exploring the central role of negative affectivity. *Psychological Review*, 96, 234–254. doi:10.1037/0033-295X.96.2.234
- Weinstein, N., & Ryan, R. M. (2010). When helping helps: Autonomous motivation for prosocial behavior and its influence on well-being for the helper and recipient. *Journal of Personality and Social Psychology*, 98, 222–244. doi:10.1037/a0016984
- Wheeler, J. A., Gorey, K. M., & Greenblatt, B. (1998). The beneficial effects of volunteering for older volunteers and the people they serve: A meta-analysis. *The International Journal of Aging and Human Development*, 47, 69–79. doi:10.2190/VUMP-XCMF-FQYU-V0JH
- Williams, G. C., Patrick, H., Niemiec, C. P., Williams, L. K., Divine, G., Lafata, J. E., ... Pladevall, M. (2009). Reducing the health risks of diabetes: How self-determination theory may help improve medication adherence and quality of life. *The Diabetes Educator*, 35, 484–492. doi:10.1177/0145721709333856
- Williams, S., & Shiaw, W. T. (1999). Mood and organizational citizenship behavior: The effects of positive affect on employee organizational citizenship behavior intentions. *The Journal of Psychology*, 133, 656–668. doi:10.1080/00223989909599771

Appendix 1. Weekly autonomy support messages for performing acts of kindness

Providing a rationale

Hey, [participant name]! Did u know that doing acts of kindness helps u become happier?! A bunch of studies show that people who do five acts of kindness for other people all in one day are happier than people who don't! :)

Hey, [participant name]! Did u know that performing acts of kindness is kinda like the domino effect? Legit studies have been done to show that if people see or hear bout an act of kindness they are more likely to do one themselves! Who knows what impact u might have :)

Giving a sense of choice

Hey, [participant name]! I hope ur excited to do five acts of kindness all in one day :) Just wanted to let ya know that where u do these acts and who u do them for is totally up to u. Feel free to do this however u want! :)

Hey [participant name]! There's a bunch of places to do the five acts of kindness all in one day. You might wanna do them at home or at school or somewhere else. Either way, do whatever u want! :)

Acknowledging the perspective of participants

Hey, [participant name]! I know u might think that doing five acts of kindness all in one day may seem kinda difficult or awkward lol. Just do the best u can and u will start to feel more comfortable as time goes on! :)

Hey [participant name]! So u might be thinking that doing these five acts of kindness in one day is kinda random or forced, but just keep trying to do them and in time u will feel more comfortable and that ppl appreciate them. Plus u will feel really good about urself lol :)

Weekly autonomy support messages for completing academic coursework

Providing a rationale

Hey (participant name)! Did u know that taking notes while doing reading for class totally helps u out during the test? Studies show that ppl who take notes while reading do way better than ppl who don't!

Hey, (participant name)! Did u know that A students spend 2 hrs studying for every hour they are in class? Legit studies have been done to show that students that fail only study 1/3

as much as A students. Putting in the time to study really helps a lot :)

Giving a sense of choice

Hey (participant name)! I hope ur excited to study! :) Just wanted to let ya know that where u study and how u do it is totally up to u. Do this however u want! :)

Hey (participant name)! There's a bunch of places u can study. You might wanna study at the library or at home or somewhere else. Either way, do whatever u want! :)

Acknowledging the perspective of participants

Hey (participant name)! I know u might think that doing school stuff is kinda lame or boring lol. Just do the best u can and it will get better as time goes on! :)

Hey (participant name)! So u might be thinking that doing homework or studying is kinda annoying or stressful, but just hang in there and after a while it won't be so bad. Plus u might learn something cool lol.