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Is variety the spice of happiness? More variety is associated with lower efficacy of positive activity interventions in a sample of over 200,000 happiness seekers

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ABSTRACT

An empirically supported approach to increase one's happiness (or well-being) is to engage in brief, self-directed positive activities in daily life. However, such positive activities may fail to bring lasting changes in well-being due to hedonic adaptation. Notably, previous research has shown that variety is a key factor that can slow hedonic adaptation and can improve the efficacy of positive activities. The current study examines the role of variety, along with other factors, while practicing well-being boosting activities within a large sample of happiness seekers ($N = 218,606$) who used an application that provides users with bundles of positive exercises to increase their well-being. Our results showed that using a wider variety of positive activities was associated with smaller – not bigger – boosts in well-being. Furthermore, people who engaged in more varied activities selected less generally effective activities than those who engaged in less varied activities.

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Happiness is associated with myriad positive outcomes, such as longer lifespan (Diener et al., 2017), lower long-term risk of suicide (Koivumaa-Honkanen et al., 2001), higher earnings (Walsh et al., 2018), and more fulfilling marriages (Harker & Keltner, 2001), among others (Lyubomirsky et al., 2005). Given its numerous rewards, it is no wonder that being happy is a goal of many individuals worldwide (Diener, 2000). For those seeking to increase their happiness, a growing body of literature has demonstrated the efficacy of using brief, self-directed positive activities in daily life (see Bolier et al., 2013; Sin & Lyubomirsky, 2009; White et al., 2019, for reviews). Researchers have identified and empirically tested many types of positive activities to improve well-being, including performing acts of kindness (Nelson et al., 2016), expressing gratitude (Layous et al., 2017), visualizing optimistic futures (Lyubomirsky et al., 2011), and savoring (Hurley & Kwon, 2012). Unfortunately, however, although these practices are effective in improving well-being, their benefits are often short-lived. For example, in some studies, levels of life satisfaction returned to baseline shortly after the intervention period (Emmons & McCullough, 2003; Lyubomirsky et al., 2011; Seligman et al., 2006).

Hedonic adaptation

One key reason why positive activities provide only short-lived increases in well-being is hedonic adaptation, which is the dampening of an individual's emotional response to negative or positive experiences over time (Frederick & Lowenstein, 1999; Okabe-Miyamoto & Boehm, 2020). Hedonic adaptation is generally adaptive, as maintaining high levels of emotion, whether positive or negative, over long periods time, could be overwhelming (Kahneman & Tversky, 1979), and adaptation helps redirect attention in ways that are vital for survival. For example, if an individual's negative emotions do not abate after the end of a relationship, the resulting sadness and/or anger could lead to reduced productivity, poor parenting, and job loss, which could impact physical and mental health. Thus, hedonic adaptation is necessary to bounce back from negative life experiences such as divorce (Lucas, 2005), a new disability (Hernandez et al., 2014), and bereavement (Luhmann, Hofmann, Eid, & Lucas, 2012). Similarly, although perhaps paradoxically, it is vital for individuals to rebound from positive experiences, such as winning the lottery (Brickman, Coates, & Janoff-Bulman, 1978). Lottery winners who remain in a state of elation run the risk of alienating friends and family, overlooking signs of others taking advantage of their good fortune, having trouble

concentrating on important life tasks, or spending excessive amounts of money on hedonic gains. Notably, the hedonic adaptation process is quicker and more 'complete' with regard to positive experiences (e.g., raise in salary) compared to negative experiences (e.g., reduction in salary), which poses a major barrier for positive practices to increase happiness in a lasting way (Lyubomirsky, 2012).

Variety

A key insight into how to overcome hedonic adaptation comes from the principle that variable stimuli are difficult to adapt to (Berlyne & Boudewijns, 1971), because variety provides novel and engaging experiences (Berlyne, 1970). Thus, a promising approach to achieving lasting happiness involves intentionally undertaking positive activities that produce results that unfold in a varied way. Supporting this idea, the Hedonic Adaptation Prevention (HAP) Model (Sheldon & Lyubomirsky, 2012; see Figure 1) posits two causal sequences that stem from positive experiences. To wit, initial positive changes (like beginning to practice gratitude or kindness) lead to (1) downstream positive events (e.g., feeling more connected to family), which lead to greater positive emotions that subsequently decline and return to baseline levels over time and (2) increases in one's aspirations (e.g., *expecting* to feel more connected), which lead to declines in well-being over time. Variety in one's positive changes (e.g., practicing gratitude, kindness, and savoring) plays a key moderating role in the HAP model, in that it slows hedonic adaptation in both pathways by increasing the number of positive events and emotions, as well as reducing the likelihood of increased aspirations.

Supporting this model, variety has been shown to combat hedonic adaptation in people's daily lives. In one study, relative to individuals who made a circumstantial change (such as moving to a new apartment), those who recently accomplished a goal (such as becoming more politically active) experienced greater variety in their lives and reported increased levels of well-being (Sheldon & Lyubomirsky, 2006). Variety also plays a role in sustaining the enjoyment of watching television shows, with studies paradoxically finding that commercial breaks increase pleasure by providing variety in entertainment stimulation, thus slowing hedonic adaptation (Nelson, Meyvis, & Galak, 2009). Furthermore, researchers have identified that having greater variety in one's hedonic spending predicts greater well-being (Ruberton, Gladstone, Margolis, & Lyubomirsky, 2020).

In sum, research has demonstrated that variety in one's daily positive experiences is linked with slower rates of hedonic adaptation to those experiences. Can engaging in a variety of positive activities also combat hedonic adaptation? According to the positive activity model (Lyubomirsky & Layous, 2013), variety impacts the efficacy of positive activity interventions. To our knowledge, only two studies to date have examined variety in happiness seeking. One experiment found that college students prompted to commit varied acts of kindness over the course of 10 weeks showed higher well-being than those prompted to commit similar acts of kindness, suggesting that variety was at least in part successful in combating hedonic adaptations to practicing kindness (Sheldon, Boehm, & Lyubomirsky, 2012). Consistent with this result, a correlational study that followed happiness seekers using a smartphone application called Live Happy found that those who practiced a wider variety of positive activities (e.g., not just gratitude but also savoring and goal setting) reported greater increases in happiness than those who used a narrower set of activities (Parks, Della Porta, Pierce, Zilca, & Lyubomirsky, 2012).

Present study

We collected an ecologically valid sample of happiness seekers who use a smartphone application that provides individuals with bundles of positive activities to complete. The goal of this research was to explore whether engaging in a variety of activities leads to bigger well-being boosts than engaging in the same types of activities. We aimed to replicate a similar previous study (Parks et al., 2012, Study 3) and extend it in five ways: (1) by calculating positive activity variety with the Shannon index, a validated technique from the emodiversity literature, rather than simply counting the number of acts; (2) by examining a longer period of activity use (median of 74 days versus 9 days in Parks et al.); (3) by using a happiness-seeking sample that is nearly 75 times larger (i.e., over 200,000 participants versus fewer than 3,000); (4) by examining how the inclusion of covariates impacts the relationship between variety of activity use and well-being growth; and, finally, (5) by exploring associations that may explain why variety of activity use is related to well-being growth. In light of the hedonic adaptation literature, as well as the results of Parks et al. (2012), we expected variety in activity use to be associated with larger well-being gains. In sum, we examined associations between three constructs: (1) well-being growth; (2) total activity use (i.e., the total number of positive exercises a participant completed); and (3) variety in activity use.

Hypotheses

We expected the following pattern of associations among our three key variables (well-being growth, total activity use, and variety in activity use). First, we expected the following association based on how those variables were constructed.

H_A: Participants who used a greater number of positive activities had more opportunities to employ variety in their activity use, as they were able to engage with more types of activities. Thus, we expected variety of activity use to be positively associated with total activity use.

Next, we expected the following associations based on previous research.

H₁: Based on previous research on the general efficacy of positive activity interventions (Bolier et al., 2013; Sin & Lyubomirsky, 2009; White et al., 2019), we expected well-being scores to increase over time, on average.

H₂: Based on the same research, we expected total activity use to be positively correlated to well-being growth. That is, the more positive exercises that users completed, the more their happiness increased.

H₃: Based on the hedonic adaptation literature, we expected variety of activity use to be positively correlated with well-being growth – that is, the more diverse the positive exercises, the bigger boosts in happiness.

Method

Procedure

Study data were collected using a smartphone application available on Android and iOS devices. When users first open the app, they complete a baseline questionnaire and a well-being assessment. Next, participants are presented with bundles of positive activities to complete serially over 2 weeks. They have the opportunity to engage in several categories of activities (i.e., savoring, reflection, goals, prosocial, and empathy), with each category containing a wide variety of activities, such as doing five kind things in one day, celebrating someone's good news, identifying what activities bring them meaning in life, savoring a memory, or creating a weekly gratitude list. Some participants are guided into certain bundles based on their responses to the baseline questionnaire. Participants are prompted to complete a well-being assessment if they open the app and have not responded to a well-being assessment in 2 weeks. They continue to complete positive activities and take well-

being assessments as long as they wish. Because this research involved existing data where subjects could not be identified, the study was exempt from institutional review board review.

Participants

We included users who had complete data on all measures. We removed 5,531 participants who only completed one well-being assessment, as we could not calculate growth in well-being for these participants. We also removed 1,513 participants who did not complete any positive activities, as variety of activity use could not be calculated for them. Lastly, we removed 723 participants who completed their first and last well-being assessment less than 3 days apart, as they created extreme scores (e.g., a Z-score > 100) on rate variables (i.e., rate of activity use and well-being growth rate), and the existence of such a short-time frame between assessments was due to an error in the assessment system; assessments are intended to be a minimum of 2 weeks apart, in order to allow time for scores to change. In addition to the statistical reasons above, these exclusionary criteria fit with our goal of examining medium to long-term growth in well-being during positive activity use.

These criteria resulted in a dataset of 716,470 well-being assessments from 218,606 individuals. Most participants (60%) completed exactly two well-being assessments ($M = 3.28$, range: 2–100, interquartile range = 1). Participants were predominantly female (87%) and between 25 and 44 years old (57%). A majority of participants (72%) were employed, 36% were in a relationship, and 48% had children. The median duration between users' first and last well-being assessment was 74 days (range: 3–1534, interquartile range: 196), and the median number of (non-unique) activities completed was 10 (range: 1–62, interquartile range = 5).

Measures

Baseline questionnaire

Participants completed demographic questions regarding their gender, employment status, relationship status, and whether they had any children. Age was also assessed with a Likert scale (0 = 18–24, 1 = 25–34, 2 = 35–44, 3 = 45–54, 4 = 55–64, 5 = 65+). In addition, participants responded to psychological items about their personality, values, and experiences, which we used as control variables – namely, their personal perceptions of 1) the importance of health, 2) the difficulty being resilient, 3) the difficulty of emotional self-disclosure, and 4) boredom with their life, as well as

Table 1. Examples of activity use profiles.

Total Activity Use	Rate of Activity Use	Variety of Activity Use	Total Activities Completed	Days Activities Completed	Savoring Activities Completed	Reflection Activities Completed	Goals Activities Completed	Prosocial Activities Completed	Empathy Activities Completed
Low	Low	Low	5	217	2	2	1	0	0
Low	Low	High	5	217	1	1	1	1	1
Low	High	Low	5	8	2	2	1	0	0
Low	High	High	5	8	1	1	1	1	1
High	Low	Low	22	957	10	8	2	2	0
High	Low	High	22	957	5	5	5	4	3
High	High	Low	22	35	10	8	2	2	0
High	High	High	22	35	5	5	5	4	3

Low = approximately 10th percentile. High = approximately 90th percentile.

the extent to which they 5) desire connection, 6) are currently experiencing stress, 7), are sociable, 8) are present-oriented, and 9) have poor health.

Well-being

Well-being scores for each assessment were calculated by averaging a positive affect index (e.g., 'In the past month, how often have you felt joyous, exuberant, inspired, and/or awestruck?' with 1 = *Never*, 5 = *Very often, almost every day*) and a life satisfaction index (e.g., 'How satisfied do you feel with yourself as a person?' with 1 = *very dissatisfied* and 7 = *very satisfied*). We converted this index, such that possible well-being scores ranged from 0 to 100 with a mean of 44.6 and a standard deviation of 19.4 (interquartile range: 28). Our analyses included all well-being assessments (i.e., not just the first and last assessments from each person).

Total activity use

Participants' total activity use scores were simply counts of how many positive activities they had completed between their first and last well-being assessments. Importantly, participants could repeat positive activities and their score would increase for each activity completed.

Rate of activity use

We calculated each user's rate of activity use by dividing the total number of activities they completed by number of days between their first and last well-being assessments. Scores ranged from 0.001 to 5.20 ($M = 0.25$, $SD = 0.30$, interquartile range = 0.31).

Variety of activity use

The positive activities that participants completed were sorted into the most common categories of positive activity interventions: mindfulness, gratitude, optimism, performing prosocial acts for others, and cognitive reframing. Each activity category contained roughly a dozen positive activities. For each participant, we calculated the proportion of their activities

from each theme. We then calculated positive activity variety by applying a formula used in the emodiversity literature that was drawn from the natural sciences to examine biodiversity. This formula originally stems from the Shannon index, which was designed to quantify the entropy of text communications (Shannon, 1948); it has been determined to be robust in psychological research examining the diversity of emotions experienced in everyday life (Quoidbach et al., 2014).

To apply this formula, we multiplied the proportion of activities in each category by its natural logarithm. We then summed these five numbers and multiplied them by -1 . Thus, for each participant, we obtained a measure of their positive activity variety, where higher values indicate more positive activity variety. As discussed by Quoidbach and his colleagues (2014), this formula for variety is impacted by both the total number of categories from which a participant completed activities, as well as the extent to which the distribution of activities was even across categories. Variety scores ranged from 0 to 1.61 ($M = 1.43$, $SD = .20$, interquartile range: .21).

To illustrate the differences between low and high levels of total activity use, rate of activity use, and variety of activity use, Table 1 presents a comparison of eight different activity use profiles (e.g., an individual who engages in many activities at a low rate but with high variety, etc.).

Results

Calculating growth in well-being

We first wanted to determine whether it was appropriate to use regression models on our dataset without nesting well-being scores within individuals. Thus, we used a multilevel model with no predictors (i.e., an unconditional cell means model) to calculate an intraclass correlation (i.e., the proportion of variance in well-being scores that can be attributed to clustering). We obtained an intraclass

correlation of .62, indicating that our analyses should consider well-being scores as nested within individuals (e.g., multilevel modelling and 2-stage least-squares regression).

Next, we examined the shape of growth in well-being scores over time. We used multilevel models with time as a fixed effect and included a random effect (so the effect of time could differ across individuals). We ran three multilevel models, with the shape of the time effect treated as linear, square-root, or logarithmic (base 10, with 1 added to each time score before log-transforming). The logarithmic model (deviance = 6,006,427) fit better than the square-root (deviance = 6,009,353) and linear (deviance = 6,028,778) models. Thus, in all subsequent models, we model logarithmic growth in well-being. Supporting our first hypothesis (H_1), participants generally increased in well-being over time, as evidenced by a positive effect of log-transformed time on well-being scores in our multilevel model ($b = 1.90$, 95% CI [1.86, 1.94], $t = 97.8$, Satterthwaite $df = 198,596.0$, $r = .21$, 95% CI [.21, .22]).

We calculated each participant's well-being growth rate by running a separate regression model for each person in which well-being was predicted from time (log-transformed). We extracted an intercept and slope for each person, with the former representing their initial well-being and the latter representing their growth rate. Well-being growth rates ranged from -74.2 to 73.5 ($M = 2.0$, $SD = 9.7$, interquartile range = 11.3).

Bivariate correlations between growth in well-being and activity use

First, we computed bivariate correlations for all person-level variables (see Table 2). We did not include 95% confidence intervals or p -values with these correlations or any subsequent correlations due to the large size of our dataset. Confidence intervals were approximately .008 in width and any correlation greater than .0042 in magnitude was significant.

Partial correlations between growth in well-being and activity use

To test our hypotheses, we examined correlations among growth in well-being, total activity use, and variety of activity use. We included baseline questionnaire variables, well-being intercept, days between first and last assessment, total activity use, variety of activity use, and growth in well-being use as potential covariates to use as statistical controls. We decided not to include rate of activity use as a potential covariate because it is

completely determined by two of the other potential covariates (total activity use and days between first and last assessment).

For each bivariate relationship, we calculated separate partial correlations for all combinations of possible covariates. In each bivariate relationship, four variables could be used as covariates (as two of the potential six covariates were being correlated). Thus, we calculated 16 (2^4) partial correlations. This total includes the case where there are no covariates, in which case the correlation is just the bivariate correlation reported in Table 2. When examining a bivariate relationship, we also examine how the selection of covariates impacts the partial correlation to gain further insight as to what may be responsible for the association. In cases where no clear pattern emerged, we do not discuss how covariates impacted the partial correlations.

Statistical artifact

We first examined correlations that were expected based on how the variables were calculated. We expected variety of activity use to be positively correlated with total activity use (H_A). As one completes more positive activities, there is greater potential for variety, as activities can be spread more evenly across activity categories.

Associations between total activity use and growth in well-being

As we noted earlier, participants generally increased in well-being over time. Was that growth related to how many positive activities participants engaged in – whether those activities were different or repeated (H_2)? Across all possible combinations of covariates, total activity use was positively correlated with well-being growth (partial r s ranging from .11 to .18). This result is consistent with the notion that positive activities improve well-being. Moreover, engaging in a greater number of activities provides opportunities to repeat the same activities (e.g., regularly expressing gratitude), thus enabling happiness seekers to develop strong positive activity habits and promoting more well-being. Alternatively, people who believed that the activities were effective, even when they were not, may have continued to use the app longer than those who did not believe the activities were effective. However, if this were the case, people who found the positive activities to be ineffective would presumably stop using the app relatively sooner – an effect reflected in a positive association between time engaging with the app and well-being growth rates. However, we found that days between first and last assessment was negatively correlated with well-being growth (see Table 2).

Table 2. Correlation matrix of person-level variables.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1. Well-Being Log Growth Rate																
2. Well-Being Intercept	-.40															
3. Baseline Well-Being	-.39	.99														
4. Baseline Positive Affect	-.36	.88	.89													
5. Baseline Life Satisfaction	-.35	.91	.92	.63												
6. Total Activity Use	.13	.00	-.02	-.04	.00											
7. Rate of Activity Use	.12	-.03	-.02	-.04	-.01	.21										
8. Variety in Activity Use	.03	-.02	-.03	-.03	-.02	.38	.15									
9. Quality of Activity Use	.05	.01	.00	-.01	.01	.13	.08	-.44								
10. Days Between First and Last Surveys	-.05	.03	.01	.01	.01	.25	-.49	.07	-.01							
11. Gender (Male)	.00	.00	.00	.02	-.02	-.04	-.03	-.05	.01	.02						
12. Gender (It's Complicated)	.01	-.01	-.01	-.01	-.01	.10	-.02	.03	-.01	.12	-.06					
13. Age	-.01	.08	.08	.10	.05	-.10	-.14	-.16	.02	.09	.04	-.02				
14. Job (Employed)	.00	.03	.03	-.01	.05	-.01	-.01	.03	-.03	-.01	.00	-.02	.05			
15. Job (Self Employed)	-.01	.06	.06	.06	.05	-.01	-.03	-.02	-.01	.03	.07	.00	.15	-.45		
16. Job (Homemaker -.10)	.01	-.03	-.03	-.02	-.03	.00	.00	.01	-.01	.01	-.08	-.01	.06	-.33		
17. Job (Student) -.14	-.01 -.10	.00	.00	-.01	.00	.04	.07	.03	.01	-.05	-.02	.02	-.43	-.46		
18. Job (Retired) -.06	-.01 -.04	.05	.05	.06	.04	-.04	-.05	-.10	.04	.03	.01	.01	.33	-.21		
19. Relationship (Yes) -.03	-.02 -.08	-.07	-.07	-.03	-.09	.01	.04	-.02	.03	-.04	.03	.00	-.07	-.02		
20. Children (Yes) .24	.00	.04	.05	.05	.03	-.09	-.07	-.06	-.03	.02	-.01	-.02	.51	.01	.08	
21. Importance of Health -.06	-.04 -.22	.22	.22	.17	.22	-.02	-.01	.04	-.04	-.03	-.03	-.03	.01	.32		
22. Difficulty Being Resilient -.04	.07 .03	-.36	-.36	-.35	-.30	.06	.01	.01	.03	.03	-.03	.02	-.05	-.05		
23. Emotional Disclosure Comfort .01	-.02	.17	.17	.14	.17	.01	-.04	.00	.00	.03	-.05	.00	.11	.00	.06	
24. Bored with Life -.11	.06 .03	-.37	-.38	-.31	-.37	.01	.01	.01	.01	.01	.00	.02	-.08	-.02		
25. Desire Connection -.03	.07 .01	-.28	-.29	-.23	-.28	.04	-.01	.01	.01	.03	.05	.02	-.08	-.05		
26. Current Stress .00	.09	-.40	-.40	-.37	-.36	.03	.00	.00	-.03	.01	-.03	.01	.02	-.03	.00	
27. Sociability -.02	-.04	.22	.22	.20	.20	-.04	-.03	.01	-.04	.00	-.04	-.02	.04	.00	.06	
28. Not Present-Oriented -.06	.08 .00	-.35	-.36	-.38	-.27	.05	.02	.04	.02	.00	-.02	.00	-.13	.00		
29. Minor Health Condition -.01	.01 .00	-.01	-.02	-.02	-.01	.07	.02	.01	.04	.01	.01	.00	-.03	-.02		
30. Major Health Condition -.02	.01 .01	-.09	-.09	-.08	-.09	.07	.01	.01	.03	.01	.00	.02	-.03	-.05		
	17	18	19	20	21	22	23	24	25	26	27	28	29			

(Continued)

Table 2. (Continued).

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
17. Job (Student)																
18. Job (Retired)	-.06															
19. Relationship (Yes)	.08	.00														
20. Children (Yes)	-.30	.10	-.16													
21. Importance of Health	-.03	-.10	-.04	.01												
22. Difficulty Being Resilient	.03	.00	.00	-.06	-.14											
23. Emotional Disclosure Comfort	-.07	.03	-.04	.06	.14	-.05										
24. Bored with Life	.04	.00	.05	-.08	-.21	.26	-.15									
25. Desire Connection	.05	-.01	.05	-.08	-.17	.24	-.06	.38								
26. Current Stress	-.01	-.02	.00	.03	-.04	.29	.02	.15	.20							
27. Sociability	-.02	.01	-.02	.02	.27	-.13	.36	-.21	-.10	.00						
28. Not Present-Oriented	.04	-.05	.01	-.09	-.06	.38	-.04	.24	.22	.30	-.07					
29. Minor Health Condition	.04	.00	.12	-.02	-.01	.00	-.02	.01	.00	.00	-.03	.01				
30. Major Health Condition	.03	.02	.07	-.03	-.07	.08	-.01	.04	.04	.11	-.04	.07	-.07			

If a variable label includes parentheses, it was a categorical variable that was dummy coded, with the response within the parentheses representing a dummy code of 1. Well-Being Log Growth Rate = logarithmic growth rate in well-being for each person, calculated with a regression model for each person. Well-Being Intercept = baseline well-being for each person, calculated using the same regression models.

Associations between variety of activity use and growth in well-being

Next, we tested our hypothesis that variety of activity use would be positively associated with growth in well-being (H_3). The magnitude and direction of the correlation between variety of activity use and growth in well-being depended on the covariates that were included. In the 16 models *without* total activity included as a covariate, the relationship was positive (partial r s ranging from .03 to .07). However, in 15 of 16 models with total activity use included as a covariate, the relationship was negative (partial r s ranging from $-.04$ to $.001$). We believe that total activity use needs to be controlled for when examining the effect of variety of activity use on growth in well-being. Variety of activity use is positively associated with total activity use, which is positively associated with growth in well-being. Thus, without controlling for total activity use, one might see a positive correlation between variety of activity use and growth in well-being because the variety of activity use

variable is carrying information about total activity use. Indeed, when considering the number of activities happiness seekers engage in, greater variety is related to decreased well-being, perhaps signaling a lack of fit between the chosen activity and the happiness seeker.

Quality of activity use

Because we suspected that variety in activity use may reflect participants cycling through activities they find ill-fitting or ineffective, we created a variable to represent the 'quality' of activities that a participant selected to perform. That is, we wanted to examine whether the positive activities participants were engaging with were leading to larger increases in well-being across the sample, which we call quality of activity use. First, we predicted logarithmic well-being growth rates (see Calculating Growth in Well-Being above) from the number of activities completed in each category. A bigger regression coefficient indicated that that activity

category was associated with greater boosts in well-being on average. For each participant, the proportion of their personal activity use in each category was multiplied by the regression coefficient for that category and then these five products were summed. This sum was higher for participants who selected a higher proportion of exercises that were associated with greater gains in well-being in our sample. Scores ranged from -0.10 to 0.30 ($M = 0.14$, $SD = 0.03$, interquartile range = 0.04), with lower scores indicating that participants are engaging in positive activities that are generally lower quality (at least as reflected in our sample of over 200,000 individuals), and higher scores indicating that participants are engaging in positive activities that are generally higher quality.

Bivariate correlations between growth in well-being and activity use

We also computed bivariate correlations for quality of activity use (see Table 2). We wish to note an important feature of our correlation matrix. Both well-being growth and total activity use are positively correlated with both variety of activity use and quality of activity use. However, variety of activity use and quality of activity use are negatively correlated to each other. Thus, in any model with variety of activity use and quality of activity use and either well-being growth or total activity use, suppression will be present (Cohen, Cohen, West, & Aiken, 2003). Typically, adding a covariate decreases the magnitude of other regression coefficients, but in cases of suppression, regression coefficients will become greater when controlling for an additional variable. We will note cases of suppression, as some of our results are impacted substantially by suppression.

Partial correlations between growth in well-being and activity use

We also calculated separate partial correlations for quality of activity use. Thus, by including quality of activity use in Tables 2, 32 (2⁵) partial correlations were calculated in total. Again, in cases where no clear pattern emerged, we do not discuss how covariates impacted the partial correlations.

Statistical artifact

We again examined correlations based on how variables were calculated. A clear suppression effect was apparent: The partial r s with quality of activity use omitted as a covariate ranged from $.36$ to $.38$, whereas the partial r s with quality of activity use included as a covariate ranged from $.47$ to $.49$. We also expected quality of activity use to be positively correlated with growth in well-being, because we defined quality of activity use as

engaging in activities that are associated with larger boosts in well-being. Indeed, across all possible combinations of covariates, quality of activity use and well-being growth were positively correlated (partial r s ranging from $.02$ to $.09$).

Associations between variety of activity use and growth in well-being

To examine why variety in activity use was negatively associated with growth in well-being, we tested this association controlling for quality of activity use. When total activity use was included as a covariate, the inclusion of quality of activity use as an additional covariate reduced the magnitude of the negative relationship between variety of activity use and growth in well-being (partial r s ranging from $-.02$ to $.001$). Thus, the quality of one's activities may explain the negative effects of practicing a variety of activities. That is, participants with low variety in their activity use may have selected the most effective activities and persisted with those activities.

To more directly explore whether those who employed low variety when choosing activities were more likely to select more effective activities that they persisted with, we examined the relationship between quality of activity use and variety of activity use. Across all possible combinations of covariates, the relationship was strong and negative. When total activity use was not included as a covariate, partial r s ranged from $-.44$ to $-.45$; and when total activity use was included as a covariate, partial r s ranged from $-.53$ to $-.54$, showing a suppression effect. Again, notably, the negative relationship between quality of activity use and variety of activity use is consistent with the notion that participants who selected the most effective 'high quality' activities continued with those same activities.

Furthermore, one might expect that participants who selected more effective activities would complete more total activities (including repeat activities), because they are more motivated to continue, or because they created stronger positive activity habits, than participants who selected fewer effective activities. Indeed, quality of activity use was positively correlated with total activity use across all possible combinations of covariates. Due to suppression, this effect was much greater when variety of activity use was controlled for. When variety of activity use was included as a covariate, partial r s ranged from $.35$ to $.37$; and when it was not included, partial r s ranged from $.12$ to $.14$. Importantly, however, the positive relationship between quality of activity use and total activity use is again consistent with the idea that participants who selected the most effective activities completed more activities.

Discussion

The central goal of the current research was to test whether variety in performing positive activities in daily life promotes greater boosts in happiness among happiness seekers. First, consistent with prior research (Bolier et al., 2013; Sin & Lyubomirsky, 2009; White et al., 2019) and supporting H₁, we found that those who engaged in positive activities increased in well-being. Extending this finding, participants who engaged in more positive activities increased more in well-being than those who engaged in fewer positive activities (H₂). Next, as we had expected (H₃), greater variety was associated with higher levels of well-being growth. Importantly, however, after controlling for total activity use – this relationship flipped. That is, when taking into account the total number of positive activities that happiness seekers engaged in, those who engaged in a wider variety of activities actually decreased in well-being.

Why was variety associated with smaller – not bigger – boosts in well-being? We propose four related reasons, all of which could be tested in future studies. First, performing different types of exercises on the app may simply mean that our participants have yet to find a set of effective exercises, so they keep trying new ones in the hopes they ‘work.’ Supporting this idea, when total activity use and quality of activity use were both controlled for, the impact of variety on well-being was further reduced, signaling that participants who employed *low* variety in their activity use may have selected activities that were most effective in improving their well-being. This interpretation is further supported by our finding that higher-quality activity use was negatively related to variety in activity use.

Second, it is possible that many participants in our study did not experience good fit with particular activities (say, mindfulness, which sometimes requires users to sit with unpleasant feelings, or cognitive reframing, which is very analytically oriented) and were bouncing from one to the next, trying to find an activity tailored to their unique traits and interests. As such, greater variety may signal poor fit between the happiness seeker and multiple activities they are trying. According to the positive activity model (Lyubomirsky & Layous, 2013), person-activity fit moderates the extent to which the pursuit of happiness is successful. For example, if an individual does not find a particular set of positive activities to be a good fit with their personality, values, or lifestyle (e.g., an introvert tasked with highly social activities), these activities are not likely to promote their well-being (Schueller, 2011;

Sin, Della Porta, & Lyubomirsky, 2011). Ill-fitting activities will not feel natural, comfortable, or meaningful and are thus difficult for happiness seekers to find satisfying and worthwhile and to continue performing.

Third, recent research has shown that under some circumstances, people prefer familiarity and repetition to variety (Winet & O’Brien, 2021). It is possible that after regularly performing certain positive activities, like keeping a gratitude diary or practicing mindfulness meditation each morning, people began to find the daily ritual and repetition comfortable and comforting. As a result, those who maintained the ritual reported greater happiness than those who cycled through new activities.

Finally, the habit literature posits that habits are formed as individuals repeatedly engage with an activity for a reward (Wood, 2017). Thus, performing a greater variety of positive activities could impede the building of habits, as it does not provide an opportunity to practice the same activity – and be rewarded for it – repeatedly. Furthermore, fit may be particularly important for the formation of habits, as individuals are less likely to engage with an ill-fitting activity long enough for a habit to form. Thus, participants who demonstrated greater variety in our study may have increased less in well-being, due to both fewer opportunities for habit formation and lack of fit.

What else proved fruitful for these participants? We found that quality of activity use was strongly and positively related to total activity use. Therefore, not surprisingly, those who chose to engage in higher-quality activities also engaged more with these activities. One implication of this finding is that some happiness seekers are already reasonably good at selecting and persisting with the activities that make them happy; thus, interventionists and app designers may not need to push or compel users to engage in the most effective evidence-based strategies. Indeed, this perspective is consistent with research on prosocial behavior, which has also revealed the benefits of autonomy for well-being. For example, individuals who completed a prosocial intervention with autonomy-support reported greater boosts in happiness than those without autonomy-support (Nelson et al., 2015; Weinstein & Ryan, 2010). However, interventionists may wish to provide direction to happiness seekers who find themselves engaging with a wide variety of activities, as this may be a sign that they are not finding optimal activities that benefit their well-being.

Notably, the results of the current study ostensibly fail to replicate a prior study that examined the role of variety in performing positive activities among happiness seekers (Parks et al., 2012). Our initial results

mirrored those of Parks et al. (2012), even with our Shannon index measure of variety. However, after we controlled for total activity use, a necessary covariate not included in Parks et al.'s analyses, our results diverged.

Limitations and future directions

Although, we used an ecologically valid sample of happiness seekers, the generalizability of our findings may be limited to those interested in pursuing happiness with the help of a smartphone app. However, given our large sample size and the ubiquitous types of activities that users were able to engage with on the app, these results are likely to generalize to the larger population of happiness seekers.

More important, our data are correlational, as we did not experimentally manipulate variety. Thus, future research is needed to experimentally examine the role of variety on well-being shifts, perhaps by randomly assigning individuals to engage in relatively more versus less varied positive activities. Notably, such an experiment would be able to control for and disentangle the potential factors underlying the present results.

Future investigators could also attempt to identify other critical moderators and mediators underlying the link between variety and well-being boosts. That is, what are the conditions under which variety makes it more – or less – likely that positive activities like gratitude, goal setting, and kindness succeed in boosting happiness? And, could a specific varied set of positive activities that work together simultaneously or in a particular order create the perfect cocktail to combat hedonic adaptation? In other words, perhaps variety should be introduced to happiness seekers in a relatively more curated way. For example, rather than being presented with high variety all at once, which may be overwhelming, individuals may benefit from smaller doses of variety introduced at opportune times as a method of increasing engagement (and decreasing hedonic adaptation). Another, related avenue for future work is to examine individual and cultural differences in preferences for variety, with the ultimate aim of matching persons with a specific set of positive activities to better tailor a particular happiness-increasing program to people's personalities, goals, and values.

Conclusion

The happiness that results from engaging in positive activities is generally short-lived, and hedonic adaptation is in part to blame. In light of past research demonstrating variety as a potential tool to thwart hedonic adaptation, our study examined the role that variety in performing positive activities plays in the extent to which such activities produce increases in well-being. However, the results from our naturalistic sample of more than 200,000 happiness seekers suggest that activity variety does not boost positive activity efficacy. It appears that sometimes variety can indicate the novelty and surprise that sustain hedonic rewards, and at other times it signals failure to find effective, fitting, comforting, or habitual happiness-boosting strategies. Future research could unpack when, how, and why the pursuit of happiness is likely to benefit from the spice of variety or to be harmed by it.

Disclosure statement

No potential conflict of interest was reported by the author(s).

References

- Berlyne, D. E. (1970). Novelty, complexity, and hedonic value. *Perception & Psychophysics*, 8(5), 279–286.
- Berlyne, D. E., & Boudewijns, W. J. (1971). Hedonic effects of uniformity in variety. *Canadian Journal of Psychology*, 25(3), 195–206. <https://doi.org/10.1037/h0082381>.
- Bolier, L., Haverman, M., Westerhof, G. J., Riper, H., Smit, F., & Bohlmeijer, E. (2013). Positive psychology interventions: A meta-analysis of randomized controlled studies. *BMC Public Health*, 13(1), 119. <https://doi.org/10.1186/1471-2458-13-119>
- Brickman, P., Coates, D., & Janoff-Bulman, R. (1978). Lottery winners and accident victims: Is happiness relative? *Journal of Personality and Social Psychology*, 36(8), 917–927.
- Cohen, J., Cohen, P., West, S. G., & Aiken, L. S. (2003). *Applied multiple regression/correlation analysis for the behavioral sciences* (3rd ed.). Lawrence Erlbaum Associates Publishers.
- Diener, E., Pressman, S. D., Hunter, J., & Delgado-Gil-Chase, D. (2017). If, why, and when subjective well-being influences health, and future needed research. *Applied Psychology. Health and Well-being*, 9(2), 133–167. <https://doi.org/10.1111/aphw.12090>
- Diener, E. (2000). Subjective well-being: The science of happiness and a proposal for a national index. *American Psychologist*, 55(1), 34–43. <https://doi.org/10.1037/0003-066X.55.1.34>

- Emmons, R. A., & McCullough, M. E. (2003). Counting blessings versus burdens: An experimental investigation of gratitude and subjective well-being in daily life. *Journal of Personality and Social Psychology, 84*(2), 377–389. <https://doi.org/10.1037//0022-3514.84.2.377>
- Frederick, S., & Loewenstein, G. (1999). Hedonic adaptation. In D. Kahneman, D. Ed, & N. Schwartz (Eds.), *Well-being: The foundation of hedonic psychology* (pp. 302–329). Russell Sage Foundation.
- Harker, L., & Keltner, D. (2001). Expressions of positive emotion in women's college yearbook pictures and their relationship to personality and life outcomes across adulthood. *Journal of Personality and Social Psychology, 80*(1), 112–124. <https://doi.org/10.1037/0022-3514.80.1.112>
- Hernandez, C. L., Elliott, T. R., Berry, J. W., Underhill, A. T., Fine, P. R., & Lai, M. H. C. (2014). Trajectories of life satisfaction five years after medical discharge for traumatically acquired disability. *Rehabilitation Psychology, 59*(2), 183–192. <https://doi.org/10.1037/a0035887>
- Hurley, D. B., & Kwon, P. (2012). Results of a study to increase savoring the moment: Differential impact on positive and negative outcomes. *Journal of Happiness Studies, 13*(4), 579–588. <https://doi.org/10.1007/s10902-011-9280-8>
- Kahneman, D., & Tversky, A. (1979). On the interpretation of intuitive probability: A reply to Jonathan Cohen. *Cognition, 7*(4), 409–411. [https://doi.org/10.1016/0010-0277\(79\)90024-6](https://doi.org/10.1016/0010-0277(79)90024-6)
- Koivumaa-Honkanen, H., Honkanen, R., Viinamäki, H., Heikkilä, K., Kaprio, J., & Koskenvuo, M. (2001). Life satisfaction and suicide: A 20-year follow-up study. *American Journal of Psychiatry, 158*(3), 433–439. <https://doi.org/10.1176/appi.ajp.158.3.433>
- Layous, K., Sweeny, K., Armenta, C., Na, S., Choi, I., Lyubomirsky, S., & Bastian, B. (2017). The proximal experience of gratitude. *PLoS ONE, 12*(7), 7. <https://doi.org/10.1371/journal.pone.0179123>
- Lucas, R. E. (2005). Time does not heal all wounds: A longitudinal study of reaction and adaptation to divorce. *Psychological Science, 16*(12), 945–950. <https://doi.org/10.1111/j.1467-9280.2005.01642.x>
- Luhmann, M., Hofmann, W., Eid, M., & Lucas, R. E. (2012). Subjective well-being and adaptation to life events: A meta-analysis. *Journal of Personality and Social Psychology, 102*(2), 592–615. <https://doi.org/10.1037/a0025948>
- Lyubomirsky, S., Dickerhoof, R., Boehm, J. K., & Sheldon, K. M. (2011). Becoming happier takes both a will and a proper way: An experimental longitudinal intervention to boost well-being. *Emotion, 11*(2), 391–402. <https://doi.org/10.1037/a0022575>
- Lyubomirsky, S., King, L., & Diener, E. (2005). The benefits of frequent positive affect: Does happiness lead to success? *Psychological Bulletin, 131*(6), 803–855. <https://doi.org/10.1037/0033-2909.131.6.803>
- Lyubomirsky, S., & Layous, K. (2013). How do simple positive activities increase well-being. *Current Directions in Psychological Science, 22*(1), 57–62. <https://doi.org/10.1177/0963721412469809>
- Lyubomirsky, S. (2012). Hedonic adaptation to positive and negative experiences. In S. Folkman (Ed.), *Oxford Handbook of Stress, Health, and Coping* (pp. 200–224). Oxford University Press.
- Nelson, L. D., Meyvis, T., & Galak, J. (2009). Enhancing the television-viewing experience through commercial interruptions. *Journal of Consumer Research, 36*(2), 160–172. <https://doi.org/10.1086/597030>
- Nelson, S. K., Della Porta, M. D., Jacobs Bao, K., Lee, H. C., Choi, I., & Lyubomirsky, S. (2015). 'It's up to you': Experimentally manipulated autonomy support for prosocial behavior improves well-being in two cultures over six weeks. *The Journal of Positive Psychology, 10*(5), 463–476. <https://doi.org/10.1080/17439760.2014.983959>
- Nelson, S. K., Layous, K., Cole, S. W., & Lyubomirsky, S. (2016). Do unto others or treat yourself? The effects of prosocial and self-focused behavior on psychological flourishing. *Emotion, 16*(6), 850–861. <https://doi.org/10.1037/emo0000178>
- Okabe-Miyamoto, K., & Boehm, J. K. (2020). Hedonic adaptation. In D. H. Saklofske, C. S. Nave, C. Stough, & A. Di Fabio (Eds.), *The Wiley encyclopedia of personality and individual differences* (pp. 237–241). John Wiley & Sons, Ltd. <https://doi.org/10.1002/9781119547143.ch40>
- Parks, A. C., Della Porta, M. D., Pierce, R. S., Zilca, R., & Lyubomirsky, S. (2012). Pursuing happiness in everyday life: The characteristics and behaviors of online happiness seekers. *Emotion, 12*(6), 1222–1234. <https://doi.org/10.1037/a0028587>
- Quoidbach, J., Gruber, J., Mikolajczak, M., Kogan, A., Kotsou, I., & Norton, M. I. (2014). Emodiversity and the emotional ecosystem. *Journal of Experimental Psychology, 143*(6), 2057–2066. <https://doi.org/10.1037/a0038025>
- Ruberton, P. M., Gladstone, J. J., Margolis, S., & Lyubomirsky, S. (2021). Adding spice to life: Variety in hedonic spending increases subjective well-being Manuscript under review. Manuscript under review.
- Schueller, S. M. (2011). To each his own well-being boosting intervention: Using preference to guide selection. *The Journal of Positive Psychology, 6*(4), 300–313. <https://doi.org/10.1080/17439760.2011.577092>
- Seligman, M. E. P., Rashid, T., & Parks, A. C. (2006). Positive psychotherapy. *American Psychologist, 61*(8), 774–788. <https://doi.org/10.1037/0003-066X.61.8.774>
- Shannon, C. E. (1948). A mathematical theory of communication. *Bell System Technical Journal, 27*(3), 379–423.
- Sheldon, K. M., Boehm, J. K., & Lyubomirsky, S. (2012). Variety is the spice of happiness: The hedonic adaptation prevention model. Oxford University Press. DOI: [10.1093/oxfordhb/9780199557257.013.0067](https://doi.org/10.1093/oxfordhb/9780199557257.013.0067)
- Sheldon, K. M., & Lyubomirsky, S. (2006). Achieving sustainable gains in happiness: Change your actions, not your circumstances. *Journal of Happiness Studies, 7*, 55–86. <https://doi.org/10.1007/s10902-005-0868-8>
- Sheldon, K. M., & Lyubomirsky, S. (2012). The challenge of staying happier: Testing the hedonic adaptation prevention model. *Personality and Social Psychology Bulletin, 38*(5), 670–680. <https://doi.org/10.1177/0146167212436400>
- Sin, N. L., Della Porta, M. D., & Lyubomirsky, S. (2011). Tailoring positive activity interventions to treat depressed individuals. Routledge/Taylor & Francis Group.
- Sin, N. L., & Lyubomirsky, S. (2009). Enhancing well-being and alleviating depressive symptoms with positive psychology interventions: A practice-friendly meta-analysis. *Journal of Clinical Psychology, 65*(5), 467–487. <https://doi.org/10.1002/jclp.20593>

- Walsh, L. C., Boehm, J. K., & Lyubomirsky, S. (2018). Does happiness promote career success? Revisiting the evidence. *Journal of Career Assessment*, 26(2), 199–219. <https://doi.org/10.1177/1069072717751441>
- 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(2), 222–244. <https://doi.org/10.1037/a0016984>
- White, C. A., Uttl, B., Holder, M. D., & Pietschnig, J. (2019). Meta-analyses of positive psychology interventions: The effects are much smaller than previously reported. *PLOS ONE*, 14(5), e0216588. <https://doi.org/10.1371/journal.pone.0216588>
- Winet, Y. K., & O'Brien, E. (2021). Ending on a familiar note: Last chances motivate repeat consumption. *Working Paper*.
- Wood, W. (2017). Habit in personality and social psychology. *Personality and Social Psychology Review*, 21(4), 389–403. <https://doi.org/10.1177/1088868317720362>