Everyday creative activity as a path to flourishing

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Abstract:

Recent experience sampling and diary studies have shown that spending time on creative goals during a day is associated with higher activated positive affect (PA) on that day. Based on models of creativity as a tool for promoting well-being, the present study examined cross-day relationships between creative activity, affect, and flourishing. A large sample of young adults (n = 658) took part in a 13-day daily diary study. Each day, they reported how much time they spent on creative activities, daily positive and negative affect, and daily flourishing. Lagged multilevel models revealed that people felt higher activated PA and flourishing following days when they reported more creative activity than usual. The other direction – PA predicting next-day creative activity – was not supported, suggesting that the cross-day effect was specific to creative activity predicting well-being. Overall, these findings support the emerging emphasis on everyday creativity as a means of cultivating positive psychological functioning.

Keywords: Creativity | well-being | flourishing | affect | emotion | mood | personality

Article:

Are creative people happier and more satisfied with their lives? Or does creativity come at an emotional cost, as implied by the long-standing stereotype of the tormented genius? Creativity research has typically studied this question by exploring how creativity measured with laboratory tasks or with creative achievements is related to emotional states or traits (Silvia & Kaufman, 2010). In the present study, however, we examined how daily creative activity is related to the dynamics of people's emotional experiences in their everyday environments. By testing the directionality between daily creative activity and three measures of emotional well-being (positive affect [PA], negative affect [NA], and flourishing), we aimed to answer a novel question: Does engaging in everyday creative acts make people feel better emotionally?

There is growing recognition in psychology that creativity is associated with emotional functioning (Forgeard & Elstein, 2014; Lomas, 2016). However, most of this research focuses on

how emotions benefit or hamper creativity, not whether creativity benefits or hampers emotional well-being (but see Lomas, 2016). Although popular culture links creativity to negative states like madness or sadness, and there is some evidence for that association in some domains of the creative arts (Baas, Nijstad, Boot, & De Dreu, 2016; Carson, 2011; Kaufman & Baer, 2002; Kyaga et al., 2013; Ludwig, 1992), research suggests that creativity stems from a place of positivity for most people (e.g. Conner & Silvia, 2015; Le, Cropley, & Gleaves, 2015). A meta-analysis of the mood and creativity literature found that emotional states that were positive, activated, and motivating – states such as feeling happy, upbeat, and elated – were particularly likely to foster creative ideas in the laboratory (Baas, De Dreu, & Nijstad, 2008). Positive emotional states have been shown to increase creativity regardless of whether emotional states are induced through film clips (Isen, Daubman, & Nowicki, 1987), free candy (Isen et al., 1987), or even dancing (Campion & Levita, 2014).

Research outside of the laboratory also suggests a link between positive emotional states and creativity in both workplace and university settings. For example, higher PA has been found to precede creative workplace problem-solving (Amabile, Barsade, Mueller, & Staw, 2005; Binnewies & Wornlein, 2011; but see Bledow, Rosing, & Frese, 2013; for a more dynamic view of affect and creativity). Similarly, a recent diary study found that university students were more likely to spend time on creative goals on days when they felt energetic and happy, but not angry or gloomy (Conner & Silvia, 2015), replicating findings of Silvia et al. (2014) who found similar within-person associations between the reports of happiness and everyday creative activity (see also To, Fisher, Ashkanasy, & Rowe, 2012, who found links between creativity and activated PA and NA states). Overall, these studies suggest that positive emotional states foster creative behavior.

Less well understood is the effect of creativity on emotional states. What is the emotional benefit (if any) of being creative? Does creating a new culinary dish or playing music or coming up with a novel solution to a problem at work have any benefits for well-being aside from how we might feel during the act? Although some creative acts might be light, fun, and immediately pleasurable (decorating cupcakes comes to mind), other creative acts are harder and might not feel good while in process (such as writing, for some, or learning to play an instrument or problem-solving). The emotional consequence of creativity is still an open question.

Some research supports the idea that creativity improves emotional well-being. Cross-sectional research in workplace settings found that Swedish employees who rated their workplace as more creative reported greater enthusiasm and less depression than employees who viewed their workplace as less creative (Rasulzada & Dackert, 2009). Another study found that higher employee creativity, as rated by their manager, was related to greater self-reported excitement and interest, and lower loneliness and depression (Wright & Walton, 2003). However, longitudinal designs have yielded mixed evidence for the benefits of creativity. One longitudinal daily diary study of workplace creativity and PA found no carry-over effects of creativity on PA the next day, although qualitative analysis of diary records suggested that people felt better immediately following creative events in their workday (Amabile et al., 2005). In contrast, a recent two-wave longitudinal study found significant reciprocal relationships between creativity and affect across two semesters among university students (Rogaten & Moneta, 2015). Participants who scored higher on the Positive and Negative Affect Schedule Short Form

(iPANAS-SF) at Time 1 reported improvements in creativity at Time 2 and participants who scored higher on a measure of creativity at Time 1 reported improvement in their iPANAS-SF scores at Time 2, suggesting reciprocal causal relationships between creativity and affect. However, that study did not separate measures of PA and NA so it is not known whether creativity affected PA independently of NA. Intervention designs are still relatively rare in creativity research (for a review, see Forgeard & Eichner, 2014), but research suggests that art-making interventions can reduce stress and anxiety (e.g. Bell & Robbins, 2007; cf. Forgeard & Eichner, 2014) and that classroom-based creative expression programs incorporating dance, drama, or the visual arts may improve mental health in some children (Beauregard, 2014).

Another open question is how creativity might influence other elements of well-being aside from affect. One might expect creativity to be particularly related to flourishing, or what psychologists have described as 'eudaimonic well-being', a state of optimal functioning accompanied by feelings of meaning, engagement, and purpose in life (Ryan & Deci, 2001). Creative pursuits are often self-driven and intrinsically motivating, key motivations that lead to greater flourishing (Ryan & Deci, 2000). Creativity is also linked to flow states, which have positive effects on subsequent flourishing and happiness (Csikszentmihalyi, 2013). If engaging in creative behavior does increase well-being, it seems likely to enhance people's sense of flourishing, in addition to whatever effects it has on PA and NA.

The goal of the present research was to test whether creative behavior in daily life leads to increases in well-being as measured by PA, NA, and flourishing. We capitalized on an existing daily diary data-set of 658 young adults who reported on their daily experiences of PA, NA, flourishing, and creative activity, embedded within a larger diary of common daily behaviors (reported in Conner, Brookie, Richardson, & Polak, 2015; Conner & Silvia, 2015). We used lagged analyses to test whether self-reported creative activity on one day carried over to increases in next-day well-being and vice versa (i.e. whether well-being increased next-day creative activity) following best practice principles for inferring causal patterns in diary data. Our use of lagged analyses was the critical component of this article: if we can show cross-day effects of creative behavior onto well-being, these results could suggest creativity as a possible point of entry for improving well-being (Forgeard & Eichner, 2014; Richards, 2007). We predicted that daily creativity would predict increases in next-day well-being, particularly increased PA and sense of flourishing. However, we were agnostic about whether creative activity would lead to reduced NA the next day, given past inconsistencies in research. Although a majority of research suggests creativity is linked specifically to PA rather than NA (e.g. Baas et al., 2008; Conner & Silvia, 2015; Silvia et al., 2014), art therapy research has shown that creativity can reduce NA (e.g. Bell & Robbins, 2007; Drake & Winner, 2012, 2013).

We also tested whether the carry-over effects of creativity were moderated by certain personality traits. Does creative activity increase feelings of well-being for all people, or just some people? This is an important question because it could establish boundary conditions on the benefits of everyday creativity. One likely moderator is *openness to experience*, a general tendency toward cognitive exploration that is one of the major broad personality traits and a recurring factor in research on creativity (DeYoung, 2014; Oleynick et al., in press). People higher in openness have more creative goals, higher creative self-efficacy, and more creative accomplishments (Feist, 1998; Ivcevic & Brackett, 2015; Karwowski, 2014; Kaufman et al., 2016; McCrae, 1987;

Silvia et al., 2014), and they are more likely to view themselves as creative people for whom being creative is valued (Karwowski & Lebuda, 2016). In the prior daily diary analyses, people high in openness to experience had a stronger positive yoking between same-day PA and creative activity (Conner & Silvia, 2015). Therefore, it is possible that open people might get a stronger boost in well-being after engaging in creative acts, possibly because creativity satisfies their greater need for autonomy and is concordant with their identity as creative people (Ryan & Deci, 2000).

Method

Participants

This is the same sample of participants reported in Conner and Silvia (2015). Participants were 658 young adults (70.2% women), on average 19.8 years old (range 17–25 years; SD = 1.7), and mostly of European ethnicity (79.2%; Asian 10.9%; Māori or Pacific Islander 5.3%; Indian 2.6%; other or mixed ethnicity 2.0%). All were students at the University of Otago, New Zealand, taking part in the 2013 and 2014 waves of the Daily Life Study, a large interdisciplinary study of the daily health and well-being of young adults. Although we recruited young adults for purposes of the larger study (which focused on this population for biological testing), this age range should provide insight into a developmental period when people may be particularly interested in trying out creative activities. Over half of the participants were recruited through the Psychology Department's experimental participation program (N = 398, 60.5%) and reimbursed with partial course credit. The remaining students were recruited through flyers, classes, or word of mouth (N = 260, 39.5%) and remunerated with a small cash payment. An additional 23 participants were excluded from analysis for either dropping out during the study (n = 6) or failing to complete the minimum seven diary records (n = 17).

Procedure

Participants were run in small groups of 2–6 participants. At an initial laboratory session in the Department of Psychology, participants completed informed consent and computerized measures of demographic characteristics (gender, age, and ethnicity), personality, and several other measures as part of the wider study. A research assistant explained the daily diary portion of the study, which began the next day. For the next 13 consecutive days, participants completed an online daily diary that was accessible only between 3 and 8 pm. The diary was extensive and included a range of questions about participants' feelings, thoughts, and behaviors that day, including their daily PA, NA, flourishing, and creative activity. Participants were sent an email reminder every night at 5 pm with a link to the survey website, which they accessed with an email address and password. A text-reminder to complete the survey was also sent to participants at 7 pm. After the diary portion of the study, participants returned to the laboratory two weeks after their initial session for debriefing and reimbursement.

Measures

Creative activity. Creative activity was measured in the daily diary with a single item: 'Overall, how creative were you today? Creativity includes coming up with novel or original ideas;

expressing oneself in an original and useful way; or spending time doing artistic activities (art, music, painting, writing, etc.)'. Participants responded on a five-point Likert scale (0 = *none*, 1 = *a little*, 2 = *a moderate amount*, 3 = *a lot*, 4 = *a great deal*). This item was developed based on common definitions of creativity (Hennessey & Amabile, 2010), and prior research used a similar question (Silvia et al., 2014) or this identical question (Conner & Silvia, 2015) (see the Discussion for limitations of this single item).

Positive and negative affect. The daily diary included an 18-item measure of PA and NA based on the circumplex model of affect (Barrett & Russell, 1999). There were nine-items measuring PA at different levels of activation [*energetic*, *enthusiastic*, *excited* (high activation), *happy*, *cheerful*, *pleasant* (medium activation), *calm*, *content*, *relaxed* (low activation)] and nine-items measuring NA at different levels of activation [*angry*, *hostile*, *irritable* (high activation), *nervous*, *anxious*, *tense* (medium activation) and *dejected*, *sad*, *unhappy* (low activation)]. Participants rated each adjective for how they 'felt today' on a five-point Likert scale (1 = *not at all*, 5 = *extremely*). Responses were averaged each day for a measure of PA (α = 0.895) and NA (α = 0.760) and at various levels of activation (PA high, medium, low, αs = 0.729, 0.771, 0.642; NA high, medium, low, αs = 0.630, 0.716, 0.724). Alpha reliabilities were computed using recommended nested data guidelines from Nezlek (2012).

Flourishing. The daily diary included the eight-item Flourishing Scale that assessed feelings of purpose and meaning in life, engagement, and social connectedness (DFS: Diener et al., 2010). We adapted the scale for daily format by phrasing each item in past tense and adding the word 'today' ('Today, I led a purposeful and meaningful life'; 'Today, I was engaged and interested in my daily activities.'; 'Today, my social relationships were supportive and rewarding.'). Participants rated each item for how they 'felt today' on a Likert scale from 1 (Strongly disagree) to 7 (Strongly agree). Responses were averaged each day for a measure of daily flourishing (α = .859; Nezlek, 2012).

Personality traits. The Big Five personality traits were assessed using the 60-item NEO Five-Factor Inventory (NEO-FFI; Costa & McCrae, 1992) administered by computer at the first laboratory session. Participants rated each of these statements on a five-point Likert scale from 1 (*strongly disagree*) to 5 (*strongly agree*), which were averaged for a measure of neuroticism (α = 0.854), extraversion (α = 0.789), openness to experience (α = 0.741), conscientiousness (α = 0.862), and agreeableness (α = 0.757).

Data preparation and analysis. Participants completed 12 out of 13 diaries on average (90% response rate; *M* = 11.7; SD = 1.5; range 7–13). There were 7663 diaries. The data files were lagged by one day, which reduced the diary records to 6325 for the lagged analysis. We analyzed the data using the Hierarchical Linear Modeling program (HLM; version 6.08; Raudenbush, Bryk, & Congdon, 2004) which is ideally suited to modeling nested repeated-measures data-sets with missing data. Specifically, HLM was used to determine the carry-over effects of daily creative activity on next-day changes in well-being (PA, NA, flourishing) and vice versa using the following lagged models:

$$\text{Level 1: } PA_{T+1} = B_0 + B_1(\text{Creativity}_T) + B_2(PA_T) + B_3(\text{Weekend}_T) + r \quad (1)$$

$$\text{Level 2: } B_0 = G_{00} + u_0 \tag{2}$$

$$B_1 = G_{10} + u_1 \tag{3}$$

$$B_2 = G_{20} + u_2 \tag{4}$$

$$B_3 = G_{30} \tag{5}$$

The level-1 equation was computed for each participant. Next-day PA (Time + 1) was the outcome variable, which was predicted by creative activity (person-centered), controlling for same day PA (person-centered), and a weekend covariate to control for weekday versus weekend differences in affect and creativity (0 = Weekday, M–F; 1 = weekend, Sat–Sun; Liu & West, 2016). The level-2 equations characterized the average within-person effects across all participants. A significant G_{10} coefficient from Equation (3) indicated a significant carry-over effect of creativity on changes in next-day PA. This model was run for PA, NA, and flourishing as separate level-1 outcomes. Exploratory analyses were also run testing the different levels of activation PA and NA separately. We also tested whether participants varied in the strength of their carry-over effects (chi-square tests of u_1) and all other parameters tested.

Next, the direction of the models was reversed to examine any carry-over effects of daily PA on next-day changes in creative activity using the following equations:

$$\begin{aligned}\text{Level 1: Creativity}_{T+1} &= B_0 + B_1(\text{Creativity}_T) + B_2(\text{PA}_T) \\ &\quad + B_3(\text{Weekend}_T) + r\end{aligned} \tag{6}$$

$$\text{Level 2: } B_0 = G_{00} + u_0 \tag{7}$$

$$B_1 = G_{10} + u_1 \tag{8}$$

$$B_2 = G_{20} + u_2 \tag{9}$$

$$B_3 = G_{30} \tag{10}$$

A significant G_{20} coefficient would indicate significant carry-over effects of PA on next-day changes in creative activity. This process was repeated for NA and flourishing as separate level-1 predictors (all person-centered).

Lastly, to test for moderation by personality, we added neuroticism, extraversion, openness, conscientiousness, and agreeableness as simultaneous level-2 predictors (all grand mean-centered) to predict the intercepts (Equations (2) and (7)) and carry-over slopes (Equations (3) and (9)). This was done only for models with significant variability in the carry-over effects.

Results

Table 1 presents the descriptive statistics, some of which were reported in Conner and Silvia (2015). Table 2 presents our main results for the lagged analyses, which have not been published elsewhere. Results showed that creative activity predicted significant increases in next-day well-being, but not the other way around. Engaging in creative pursuits on one day predicted significant increases in next-day PA and, to a stronger extent, next-day flourishing (G_{10} coefficients top of Table 2), but experiencing higher PA or flourishing on one day did not predict more creative activity the next day (G_{20} coefficients bottom of Table 2). No carry-over effects were observed in either direction between creative activity and NA.

Table 1. Descriptive statistics and correlations among measures.

	M	**SD**	**Range**	**Creativity**	**PA**	**NA**	**Flourish**
Creativity	1.18	0.75	0.00–3.62	–	0.347^{***}	0.062	0.270^{***}
PA	3.00	0.49	1.24–4.48	0.188^{***} (0.009)	–	-0.354^{***}	0.723^{***}
NA	1.69	0.47	1.00–3.25	-0.050^{***} (0.007)	-0.373^{***} (0.017)	–	-0.454^{***}
Flourishing	4.70	0.83	1.33–6.85	0.307^{***} (0.015)	0.957^{***} (0.020)	-0.497^{***} (0.023)	–

Notes: PA = positive affect; NA = negative affect. Means (*M*), standard deviations (SD), and ranges computed on aggregated daily variables. Correlations above the diagonal are between-person correlations in standard deviation units computed in SPSS (IBM Corp, 2012). Correlations below the diagonal are average within-person associations in unstandardized units (with robust standard errors and 7615–7617 degrees of freedom) computed from multilevel modeling. Descriptive statistics for the personality variables are published in Conner and Silvia (2015). *** $p < .001$

Table 2. Results for the lagged analyses testing how creative activity carries over to next-day well-being (top) and how well-being carries over to next-day creative activity (bottom).

Outcome						
Predictors	***G***	**Coef**	**SE**	***p***	**df**	**Variance test**
PA_{T+1}						
Intercept	G_{00}	3.010	0.020	<0.001	657	5916.93^{***}
$Creativity_T$	G_{10}	0.021	0.010	0.029	657	654.51
PA_T	G_{20}	0.124	0.015	<0.001	657	645.27
$Weekend_T$	G_{30}	−0.066	0.014	<.0001	6298	
NA_{T+1}						
Intercept	G_{00}	1.698	0.019	<0.001	657	6971.24^{***}
$Creativity_T$	G_{10}	0.008	0.009	0.372	657	745.20^{**}
NA_T	G_{20}	0.069	0.016	<0.001	657	583.11
$Weekend_T$	G_{30}	−0.020	0.012	0.109	6300	
$Flourishing_{T+1}$						
Intercept	G_{00}	4.738	0.033	<0.001	657	7179.02^{***}
$Creativity_T$	G_{10}	0.052	0.015	0.001	657	768.17^{***}
$Flourishing_T$	G_{20}	0.055	0.016	<0.001	657	726.92^{**}
$Weekend_T$	G_{30}	−0.118	0.023	<0.001	6286	
$Creativity_{T+1}$						
Intercept	G_{00}	1.200	0.032	<0.001	657	5403.06^{***}
$Creativity_T$	G_{10}	0.043	0.016	0.008	657	675.86^{*}
PA_T	G_{20}	−0.017	0.024	0.462	657	786.16^{***}
$Weekend_T$	G_{30}	−0.102	0.023	<0.001	6278	
$Creativity_{T+1}$						
Intercept	G_{00}	1.200	0.032	<0.001	657	5369.64^{***}

Outcome						
Predictors	***G***	**Coef**	**SE**	***p***	**df**	**Variance test**
Creativity$_T$	G_{10}	0.042	0.015	0.007	657	634.97
NA$_T$	G_{20}	0.014	0.026	0.599	657	705.86**
Weekend$_T$	G_{30}	−0.103	0.023	<0.001	6297	
Creativity$_{T+1}$						
Intercept	G_{00}	1.200	0.032	<0.001	657	5369.33***
Creativity$_T$	G_{10}	0.035	0.016	0.029	657	661.24
Flourishing$_T$	G_{20}	0.021	0.016	0.176	657	755.75***
Weekend$_T$	G_{30}	−0.104	0.023	<0.001	6279	

Notes: PA = positive affect; NA = negative affect; Coef = coefficient from Hierarchical Linear Modeling; SE = Robust standard error; df = degrees of freedom; variance test (chi-square statistic) indicating individual variation in that parameter around the average estimate.
* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

Table 3 presents the lagged analyses when analyzing PA and NA at different levels of activation separately. The carry-over effects of creative activity onto next-day PA were especially pronounced for high activation PA states: People who engaged in creative pursuits today felt significantly more *energetic*, *enthusiastic*, and *excited* the next day (Table 3, Row 1). Daily creative activity also carried over to increased low activation PA states the next day like feeling *calm*, *content*, and *relaxed* (Table 3, Row 3). However, there was only a trend for creative activity to carry over to increased medium activation PA states like feeling *happy*, *cheerful*, and *pleasant* (Table 3, Row 2). There were no carry-over effects of creative activity onto next-day NA at any level of activation (Table 3, Rows 4–6). And, there were no carry-over effects of affect at any level of activation onto next-day creative activity (Table 3, Rows 7–12).

Table 3. Results for the lagged analyses testing how creative activity carries over to next-day PA and NA at different levels of activation (top) and how PA and NA at different levels of activation carries over to next-day creative activity (bottom).

Outcome						
Predictors	***G***	**Coef**	**SE**	***p***	**df**	**Variance test**
PA Hi activation$_{T+1}$						
Creativity$_T$	G_{10}	0.040	0.012	0.001	657	666.04*
PA Med activation$_{T+1}$						
Creativity$_T$	G_{10}	0.021	0.011	0.057	657	684.87*
PA Low activation$_{T+1}$						
Creativity$_T$	G_{10}	0.026	0.011	0.015	657	637.27
NA Hi activation$_{T+1}$						
Creativity$_T$	G_{10}	0.014	0.010	0.162	657	751.82***
NA Med activation$_{T+1}$						
Creativity$_T$	G_{10}	0.002	0.011	0.872	657	638.16
NA Low activation$_{T+1}$						
Creativity$_T$	G_{10}	0.003	0.010	0.790	657	765.74***
Creativity$_{T+1}$						
PA Hi activation$_T$	G_{20}	−0.014	0.019	0.464	657	751.83***
Creativity$_{T+1}$						
PA Med activation$_T$	G_{20}	−0.031	0.021	0.129	657	793.57***

Outcome						
Predictors	***G***	**Coef**	**SE**	***p***	**df**	**Variance test**
Creativity$_{T+1}$						
PA Low activation$_T$	G_{20}	0.005	0.020	0.818	657	740.51***
Creativity$_{T+1}$						
NA Hi activation$_T$	G_{20}	0.012	0.023	0.604	657	672.17**
Creativity$_{T+1}$						
NA Med activation$_T$	G_{20}	0.009	0.018	0.623	657	682.01*
Creativity$_{T+1}$						
NA Low activation$_T$	G_{20}	0.009	0.022	0.694	657	706.89***

Notes: PA = positive affect; NA = negative affect; Coef = coefficient from Hierarchical Linear Modeling; SE = Robust standard error; df = degrees of freedom; variance test (as a chi-square statistic) indicating individual variation in that parameter around the average estimate. Only one coefficient from each model (either G_{10} or G_{20}) is presented for parsimony.
* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

Next, we tested whether the cross-day effects of creative activity on PA and flourishing could be due to increases in next-day creative activity. Our previous paper showed a strong within-person link between PA and creative activity on the same day (Conner & Silvia, 2015). It is possible that being creative today begets more creative activity tomorrow, which is the proximal cause of well-being changes the next day. To test this, we controlled for next-day creative activity (creativity$_{T+1}$) by adding it as an additional level-1 predictor (group-centered) to the models predicting next-day PA and flourishing. When we did this, the carry-over effects of creative activity on next-day PA continued to be significant for high activation PA (G_{10}(SE) = 0.029(0.011), $p = 0.012$), but was not significant for overall PA (G_{10}(SE) = 0.014(0.009), $p = 0.123$), medium activation PA (G_{10}(SE) = 0.011(0.010), $p = 0.298$) or low activation PA (G_{10}(SE) = 0.020(0.010), $p = 0.068$). The carry-over effect of creative activity on next-day flourishing continued to be significant (G_{10}(SE) = 0.042(0.014), $p = 0.003$). These findings suggest that creative activity had unique effects on next-day enthusiasm and flourishing that were not entirely driven by next-day creative pursuits.

Lastly, there was significant variance in five out of the six main carry-over effects shown in Table 2, which led us to test whether personality traits might account for this variability. Importantly, there was no significant variability in the carry-over effect of creative activity on next-day PA (Variance test $\chi^2 = 654.51$, $p = 0.084$), suggesting that creative activity benefited next-day PA similarly for all participants tested. When applying a Bonferroni correction of $p < 0.002$ to account for multiple hypothesis testing (0.05/25 tests consisting of 5 predictors × 5 models), there was no significant moderation by any of the personality traits.[1] Thus, contrary to predictions, more open people did not get a stronger boost in well-being after engaging in creative acts. This null effect occurred even with sufficient range on the openness scale (openness ranged from 2.08 to 4.75, with a mean of 3.47 and a standard deviation of 0.61 on a 1–5-point scale; see Conner & Silvia, 2015 for more detail on the personality measures).

Discussion

Our research suggests that everyday creative activity leads to increased well-being in young adults. People felt more enthusiasm and higher flourishing following days when they were more

creative than normal. To our knowledge, this is the first study to demonstrate that such an effect occurs specifically for PA and flourishing, but not for NA. These findings extend previous creativity research in several key ways. First, they suggest that creative activity can influence PA and flourishing, whereas previous research has more often shown that PA can influence creativity. These are not just reciprocal effects, however, as they appear to happen at different timescales. PA appears to increase creativity in the immediate aftermath (i.e. same day; Conner & Silvia, 2015; Isen et al., 1987), whereas we showed that creative activity predicts increased PA on the next day, but PA does not predict increased creativity on the next day. Nor does it appear that the increased well-being we found following creativity is merely a function of sustained creative behavior. Even when controlling for next-day creative activity, the previous day's creativity significantly predicted energized PA and flourishing. This finding suggests a particular kind of upward spiral for well-being and creativity: engaging in creative behavior leads to increases in well-being the next day, and this increased well-being is likely to facilitate creative activity on the same day.

These findings have several implications for the science of well-being. First, they reinforce the suggestion that encouraging creative activities could serve as an intervention strategy for improving well-being (Forgeard & Eichner, 2014). Finding ways to encourage everyday creative activities, not just master works of art, could lead directly to increased well-being. Researchers may be able to add creativity to the list of interventions that show promise for improving well-being, such as fostering gratitude (Emmons & McCullough, 2003), practicing loving kindness meditation (Fredrickson, Cohn, Coffey, Pek, & Finkel, 2008), savoring (Smith, Harrison, Kurtz, & Bryant, 2014), giving to others (Dunn, Aknin, & Norton, 2008), and exercise (Penedo & Dahn, 2005). In this way, our research supports recent reviews that propose creativity activity as an intervention to foster well-being and flourishing (Forgeard & Eichner, 2014; Lomas, 2016) and sets the stage for future intervention research. And, because personality did not moderate the effects of creativity on well-being, it seems likely that such an intervention might work for most people. In other words, one need not have a particularly creative personality (being high in openness or having an artistic skill) to benefit from finding a creative activity in which one might be interested and carrying out occasionally.

One limitation of this work was the brief and broad measure of daily creative activity. Diary and experience sampling research is limited in the number of questions one can ask, and the diversity of people's daily creative acts is large, so the measure of creativity was necessarily general. Such generality could introduce bias if, for example, people have different definitions for what they count as creative. However, this bias was mitigated by providing examples of creative activity and by conducting within-person analyses which compares each individual to his or her own average creativity. Nevertheless, an intriguing direction for future research would be to dig into possible differences in well-being due to the different kinds of creative activities people pursued in their daily lives. It is likely that the benefits of daily creativity can be linked to features of the activities. One might find differences due to whether the creative activities involve other people, stem from long-standing autonomous goals, yield feelings of competence, or foster flow states (e.g. Fullagar & Kelloway, 2009). The mediating mechanisms, moreover, could differ between people: for example, some people might benefit more from creative activities that involve other people, whereas other people might benefit from more isolated pursuits such as writing (for further discussion of mechanisms, see Forgeard & Elstein, 2014). In any case, testing such

possibilities would require a more extensive assessment of daily creativity, and it is a natural next step.

The present findings build upon the emerging emphasis on 'everyday creativity' in creativity research (Silvia, Cotter, & Christensen, in press). Traditionally, creativity research has emphasized either landmark 'Big C' creativity, such as eminent creative geniuses (e.g. Gardner, 1993; Sawyer, 2012) or the nuts and bolts of creative cognition assessed with lab tasks (e.g. Finke, Ward, & Smith, 1992; Weisberg, 2006). More recently, Richards (2007, 2010) has proposed focusing on expressions of creativity in everyday life. In her view, mundane creative experiences, such as having small moments of insight or working on a creative hobby, are both causes and effects of positive functioning. Spending time on creative goals is both a sign that people are doing well and a means of cultivating positive experiences. The present study offers unique support for Richards's perspective. Creativity and flourishing are linked both within a day, as shown in previous diary and experience sampling analyses (Conner & Silvia, 2015; Silvia et al., 2014), but they are also linked in time: working on creative pursuits in one day predicts greater flourishing the next, consistent with Richard's view of creativity as a means of promoting well-being in people's everyday environments.

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Notes
1. Agreeableness was the only personality trait that came close to moderating any carry-over effects; however, the *p* value did not exceed the level corrected for multiple hypothesis testing of $p < 0.002$. People higher in agreeableness showed a creativity hangover: they reported increased NA the next day after being creative (G_{15}(SE) = 0.042(0.018), $p = .019$) that manifested mainly as medium and low activation NA feelings like increased *anxiety* (G_{15}(SE) = 0.058(0.024, $p = 0.015$) and *sadness* (G_{15}(SE) = 0.056(0.022), $p = 0.012$). But paradoxically, people higher in agreeableness also reported significantly more carry-over from flourishing to increases in next-day creativity (G_{25}(SE) = 0.066(0.033), $p = 0.045$). Given the number of tests performed, these effects could be due to chance and require replication.

References

Amabile, T. M., Barsade, S., Mueller, J., & Staw, B. (2005). Affect and creativity at work. *Administrative Science Quarterly, 50*, 367–403. 10.2189/asqu.2005.50.3.367

Baas, M., De Dreu, C. K. W., & Nijstad, B. A. (2008). A meta-analysis of 25 years of mood-creativity research: Hedonic tone, activation, or regulatory focus? *Psychological Bulletin, 134*, 779–806. 10.1037/a0012815

Baas, M., Nijstad, B. A., Boot, N. C., & De Dreu, C. K. (2016). Mad genius revisited: Vulnerability to psychopathology, biobehavioral approach-avoidance, and creativity. *Psychological Bulletin, 142*, 668–692. 10.1037/bul0000049

Barrett, L. F., & Russell, J. A. (1999). The structure of current affect: Controversies and emerging consensus. *Current Directions in Psychological Science, 8*, 10–14. 10.1111/cdir.1999.8.issue-1

Beauregard, C. (2014). Effects of classroom-based creative expression programmes on children's well-being. *The Arts in Psychotherapy, 41*, 269–277. 10.1016/j.aip.2014.04.003

Bell, C. E., & Robbins, S. J. (2007). Effect of art production on negative mood: A randomized, controlled trial. *Art Therapy, 24*, 71–75. 10.1080/07421656.2007.10129589

Binnewies, C., & Wornlein, S. C. (2011). What makes a creative day? A diary study on the interplay between affect, job stressors, and job control. *Journal of Organizational Behavior, 32*, 589–607. 10.1002/job.v32.4

Bledow, R., Rosing, K., & Frese, M. (2013). A dynamic perspective on affect and creativity. *Academy of Management Journal, 56*, 432–450. 10.5465/amj.2010.0894

Campion, M., & Levita, L. (2014). Enhancing positive affect and divergent thinking abilities: Play some music and dance. *The Journal of Positive Psychology, 9*, 137–145. 10.1080/17439760.2013.848376

Carson, S. H. (2011). Creativity and psychopathology: A shared vulnerability model. *Canadian Journal of Psychiatry, 56*, 144–153.

Conner, T. S., Brookie, K. L., Richardson, A. C., & Polak, M. A. (2015). On carrots and curiosity: Eating fruit and vegetables is associated with greater flourishing in daily life. *British Journal of Health Psychology, 20*, 413–427. 10.1111/bjhp.2015.20.issue-2

Conner, T. S., & Silvia, P. J. (2015). Creative days: A daily diary study of emotion, personality, and everyday creativity. *Psychology of Aesthetics, Creativity, and the Arts, 9*, 463–470. 10.1037/aca0000022

Costa, P. T., Jr., & McCrae, R. R. (1992). *NEO PI-R professional manual*. Odessa, FL: Psychological Assessment Resources.

Csikszentmihalyi, M. (2013). *Creativity: The psychology of discovery and invention*. New York, NY: Harper Perennial.

DeYoung, C. G. (2014). Openness/intellect: A dimension of personality reflecting cognitive exploration. In M. L. Cooper & R. J. Larsen (Eds.), *The APA handbook of personality and social psychology: Personality processes and individual differences* (Vol. 4, pp. 369–399). Washington, DC: American Psychological Association.

Diener, E., Wirtz, D., Tov, W., Kim-Prieto, C., Choi, D. W., Oishi, S., & Biswas-Diener, R. (2010). New well-being measures: Short scales to assess flourishing and positive and negative feelings. *Social Indicators Research, 97*, 143–156. 10.1007/s11205-009-9493-y

Drake, J. E., & Winner, E. (2012). Confronting sadness through art-making: Distraction is more beneficial than venting. *Psychology of Aesthetics, Creativity, and the Arts, 6*, 255–261. 10.1037/a0026909

Drake, J. E., & Winner, E. (2013). How children use drawing to regulate their emotions. *Cognition and Emotion, 27*, 512–520. 10.1080/02699931.2012.720567

Dunn, E. W., Aknin, L. B., & Norton, M. I. (2008). Spending money on others promotes happiness. *Science, 319*, 1687–1688. 10.1126/science.1150952

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*, 377–389. 10.1037/0022-3514.84.2.377

Feist, G. J. (1998). A meta-analysis of personality in scientific and artistic creativity. *Personality and Social Psychology Review, 2*, 290–309. 10.1207/pspr.1998.2.issue-4

Finke, R. A., Ward, T. B., & Smith, S. M. (1992). *Creative cognition: Theory, research, and applications*. Cambridge, MA: MIT Press.

Forgeard, M. J. C., & Eichner, K. V. (2014). Creativity as a target and tool for positive interventions. In A. C. Parks & S. M. Schueller (Eds.), *Handbook of positive psychological interventions* (pp. 137–154). Oxford: Wiley-Blackwell.

Forgeard, M. J. C., & Elstein, J. G. (2014). Advancing the clinical science of creativity. *Frontiers in Psychology, 5*(613), 1–4.

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. 10.1037/a0013262

Fullagar, C. J., & Kelloway, E. K. (2009). Flow at work: An experience sampling approach. *Journal of Occupational and Organizational Psychology, 82*, 595–615. 10.1348/096317908X357903

Gardner, H. (1993). *Creating minds*. New York, NY: Basic Books.

Hennessey, B. A., & Amabile, T. M. (2010). Creativity. *Annual Review of Psychology, 61*, 569–598.10.1146/annurev.psych.093008.100416

IBM SPSS Statistics for Windows. (2012). Version 21.0 [Computer software]. Armonk, NY: IBM Corp.

Isen, A. M., Daubman, K. A., & Nowicki, G. P. (1987). Positive affect facilitates creative problem solving. *Journal of Personality and Social Psychology, 52*, 1122–1131. 10.1037/0022-3514.52.6.1122

Ivcevic, Z., & Brackett, M. A. (2015). Predicting creativity: Interactive effects of openness to experience and emotion regulation ability. *Psychology of Aesthetics, Creativity, and the Arts, 9*, 480–487. 10.1037/a0039826

Karwowski, M. (2014). Creative mindsets: Measurement, correlates, consequences. *Psychology of Aesthetics, Creativity, and the Arts, 8*, 62–70. 10.1037/a0034898

Karwowski, M., & Lebuda, I. (2016). The big five, the huge two, and creative self-beliefs: A meta-analysis. *Psychology of Aesthetics, Creativity, and the Arts, 10*, 214–232. 10.1037/aca0000035

Kaufman, J. C., & Baer, J. (2002). I bask in dreams of suicide: Mental illness, poetry, and women. *Review of General Psychology, 6*, 271–286. 10.1037/1089-2680.6.3.271

Kaufman, S. B., Quilty, L. C., Grazioplene, R. G., Hirsh, J. B., Gray, J. R., Peterson, J. B., & DeYoung, C. G. (2016). Openness to experience and intellect differentially predict creative achievement in the arts and sciences. *Journal of Personality, 84*, 248–258. 10.1111/jopy.2016.84.issue-2

Kyaga, S., Landén, M., Boman, M., Hultman, C. M., Långström, N., & Lichtenstein, P. (2013). Mental illness, suicide and creativity: 40-Year prospective total population study. *Journal of Psychiatric Research, 47*, 83–90. 10.1016/j.jpsychires.2012.09.010

Le, D. H., Cropley, D. H., & Gleaves, D. H. (2015). Examining the relationship between mental health, creative thought, and optimism. *The International Journal of Creativity and Problem Solving, 25*, 5–20.

Liu, Y., & West, S. G. (2016). Weekly cycles in daily report data: An overlooked issue. *Journal of Personality*, *84,* 560–579.

Lomas, T. (2016). Positive art: Artistic expression and appreciation as an exemplary vehicle for flourishing. *Review of General Psychology, 20*, 171–182. 10.1037/gpr0000073

Ludwig, A. M. (1992). Culture and creativity. *American Journal of Psychotherapy, 46*, 454–469.

McCrae, R. (1987). Creativity, divergent thinking, and openness to experience. *Journal of Personality and Social Psychology, 52*, 1258–1265. 10.1037/0022-3514.52.6.1258

Nezlek, J. B. (2012). Multilevel modeling analyses of diary-style data. In M. R. Mehl & T. S. Conner (Eds.), *Handbook of research methods for studying daily life* (pp. 357–383). New York, NY: Guilford Press.

Oleynick, V. C., DeYoung, C. G., Hyde, E., Kaufman, S. B., Beaty, R. E., & Silvia, P. J. (in press). Openness/intellect: The core of the creative personality. In G. J. Feist, R. Reiter-Palmon, & J. C. Kaufman (Eds.), *Cambridge handbook of creativity and personality research*. New York, NY: Cambridge University Press.

Penedo, F. J., & Dahn, J. R. (2005). Exercise and well-being: A review of mental and physical health benefits associated with physical activity. *Current Opinion in Psychiatry, 18*, 189–193. 10.1097/00001504-200503000-00013

Rasulzada, F., & Dackert, I. (2009). Organizational creativity and innovation in relation to psychological well-being and organizational factors. *Creativity Research Journal, 21*, 191–198. 10.1080/10400410902855283

Raudenbush, S. W., Bryk, A. S., & Congdon, R. (2004). HLM 6 for Windows [Computer software]. Skokie, IL: Scientific Software International.

Richards, R. (2007). Everyday creativity: Our hidden potential. In R. Richards (Ed.), *Everyday creativity and new views of human nature: Psychological, social, and spiritual perspectives* (pp. 25–53). Washington, DC: American Psychological Association. 10.1037/11595-000

Richards, R. (2010). Everyday creativity: Process and way of life – Four key issues. In J. C. Kaufman & R. J. Sternberg (Eds.), *The Cambridge handbook of creativity* (pp. 189–215). New York, NY: Cambridge University Press. 10.1017/CBO9780511763205

Rogaten, J., & Moneta, G. B. (2015). Use of creative cognition and positive affect in studying: Evidence of a reciprocal relationship. *Creativity Research Journal, 27*, 225–231. 10.1080/10400419.2015.1030312

Ryan, R. M., & Deci, E. L. (2000). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *American Psychologist, 55*, 68–78. 10.1037/0003-066X.55.1.68

Ryan, R. M., & Deci, E. L. (2001). On happiness and human potentials: A review of research on hedonic and eudaimonic well-being. *Annual Review of Psychology, 52*, 141–166. 10.1146/annurev.psych.52.1.141

Sawyer, R. K. (2012). *Explaining creativity: The science of human innovation* (2nd ed.). New York, NY: Oxford University Press.

Silvia, P. J., Beaty, R. E., Nusbaum, E. C., Eddington, K. M., Levin-Aspenson, H., & Kwapil, T. R. (2014). Everyday creativity in daily life: An experience-sampling study of "little c" creativity. *Psychology of Aesthetics, Creativity, and the Arts, 8*, 183–188. 10.1037/a0035722

Silvia, P. J., Cotter, K. N., & Christensen, A. P. (in press). The creative self in context: Experience sampling and the ecology of everyday creativity. In M. Karwowski & J. C. Kaufman (Eds.), *Creativity and the self*. New York, NY: Academic Press.

Silvia, P. J., & Kaufman, J. C. (2010). Creativity and mental illness. In J. C. Kaufman & R. J. Sternberg (Eds.), *The Cambridge handbook of creativity* (pp. 381–394). New York, NY: Cambridge University Press. 10.1017/CBO9780511763205

Smith, J. L., Harrison, P. R., Kurtz, J. L., & Bryant, F. B. (2014). Nurturing the capacity to savor: Interventions to enhance the enjoyment of positive experiences. In A. C. Parks & S. M. Schueller (Eds.), *The Wiley Blackwell handbook of positive psychological interventions* (pp. 42–65). Oxford: Wiley-Blackwell. 10.1002/9781118315927

To, M. L., Fisher, C. D., Ashkanasy, N. M., & Rowe, P. A. (2012). Within-person relationships between mood and creativity. *Journal of Applied Psychology, 97*, 599–612. 10.1037/a0026097

Weisberg, R. W. (2006). *Creativity: Understanding innovation in problem solving, science, invention, and the arts*. Hoboken, NJ: Wiley.

Wright, T. A., & Walton, A. P. (2003). Affect, psychological well-being and creativity: Results of a field study. *Journal of Business and Management, 9*, 21–32.