The Effect of Self-Efficacy on Personal Growth after Daily Stressors: An Experience Sampling Study

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Abstract

Objective: Growth in response to traumatic events is extensively examined but it is not clear if growth can also emerge in response to daily stressors. Due to its beneficial effect on posttraumatic growth, self-efficacy is assumed to foster personal growth. However, the research in this field is limited. This study aims to explore the association between daily stressors and personal growth and a possible effect of self-efficacy on this relationship. **Method:** In this study, the experience sampling method was used, to assess within-person differences. Participants ($N =$ 49) were asked to fill out a 11-day questionnaire, consisting of five questionnaires each day. A linear mixed model was used to conduct the analysis. The effect of daily stressors on personal growth within-person was assessed, as well as a possible moderation effect of self-efficacy. Thus, the person-mean score of each variable was calculated and used in the linear mixed model. **Results:** A positive significant effect of daily stressors on personal growth was found ($ß = .50$, $p < .001$). No significant moderation effect of self-efficacy was found on the association between daily stressors and personal growth ($ß = -.02$, $p = .19$). **Conclusion:** This study provides further insight into the process and contextual factors of personal growth. It was shown that experiencing daily stressors elicits personal growth. Self-efficacy did not seem to increase growth after daily stressors.

Keywords: Personal growth, daily stressor, self-efficacy, experience sampling

The Effect of Self-Efficacy on Personal Growth after Daily Stressors - An Experience Sampling Study

"What doesn't kill you makes you stronger". A regularly used platitude after something negative happens to ourselves or the people around us. But how much truth comes with this saying? During the past years, researchers have examined growth after traumatic experiences, such as loss, natural disaster, or injury. How an individual mentally processes such an event, as well as the effects it has on them, depends on an individual's character and personality traits (Losavio et al., 2011). For example, when an individual displays positive reappraisal, this individual could benefit from posttraumatic growth (PTG), the positive psychological change after a traumatic event or challenging experience. The same effect applies e.g. for agreeableness and a high level of spirituality (Henson et al., 2021; Tedeschi & Calhoun, 2004). PTG encompasses greater appreciation for life, a greater sense of self, the pursuit of new possibilities in life, increased use of personal strengths and improved relationships, as well as decreased levels of depression and anxiety. Hence, despite the traumatic events that evoke the potential of PTG, it might be beneficial for the overall mental well-being of the individuals. Hereby, it should be noted that not the traumatic event itself, but rather the coping mechanisms and character traits influence the possible positive outcome (Henson et al., 2021; Roeple, 2012).

Personal Growth after Daily Stressors

A subject that is connected to PTG but has received less attention so far is personal growth (PG). PG refers to the process of change, towards a positive direction of an individual's cognition, behavior, or affect (Sharma & Rani, 2013). Individuals experiencing PG drive towards greater self-actualization, aiming to make better use of their skills and self-knowledge (Roepke, 2012). PG cannot be planned but is the result of an individual's experience. While experiencing PG, an individual faces the chance to develop as a whole (Irving & Williams, 1999). This experience can occur throughout the lifespan of an individual, as a conscious or unconscious process, stimulated through environmental, intentional, or developmental triggers (Robitschek, 1998). PG has its roots in Positive Psychology and is considered a key component of acquiring mental health and positive mental well-being (Deci & Ryan, 2012). PG is associated with improved mental health, and well-being of an individual, greater life satisfaction, and contributes to a clear future-oriented goal setting, motivating the individual to strive towards their

achievements. Further, PG can contribute to self-actualization and realizing one's potential, which is crucial for mental well-being. PG can work as a buffer to reduce psychological distress, depression, and social sensitivity (Celik, 2015).

PG occurs after daily experiences and challenges, rather than after traumatic experiences. Prior research has found that PG might also occur after positive daily events, such as a happy relationship or career-related accomplishment (Roepke, 2012). In other studies, an association between negative daily events and PG was investigated. Losavio et al. (2011) conducted a study to examine the nature of growth after stressful events and identify the factors that might exert an influence on it. Participants reported growth after daily, but nevertheless challenging, events. Hence, personal growth can occur after negative daily events, also called daily stressors (DS).

The term DS describes negative, unpleasant, or stressful events encountered in everyday life (Losavio et al., 2011; Schönfeld, 2015). Most commonly, DS entails interpersonal and achievement-related stressors. Interpersonal stressors cover conflicts with another person, such as friends, family members, or romantic partners. Achievement-related stressors relate to poor performance or stress at the study- or workplace (Losavio et al., 2011). Other stressors might be rushing late, losing one's keys, or experiencing inconvenience due to the weather (Upchurch Sweeney et al., 2013).

Despite their objective being of a less severe nature compared to traumatic events, DS can have a negative impact on an individual's mental health and mental wellbeing. Further, mental health problems, such as depression or anxiety can be exacerbated (Losavio et al., 2011; O'Neill et al., 2004). The negative impact caused by DS occurs if the daily stressor does not align with the values, expectations, or core beliefs of the individual. However, these disruptions bring a need for mental processing and evaluation of the experience and therefore can also offer personal growth opportunities. This is similar to the core belief disruption caused by traumatic events, offering the chance for PTG (Losavio et al., 2011). Core beliefs describe guidelines and guiding values people often use to make sense of the world surrounding them (Calhoun & Tedeschi, 2006). While facing traumatic experiences or DS, an individual's core beliefs, values or expectations are violated. This, on the one hand, can cause negative mental health impacts. On the other hand, can also support the individual to make sense of the world around them in a new light, and to interpret it in a different way. This process of reflection and re-evaluation can lead to a positive shift in how individuals see themselves and the world around them, enabling PTG

and PG (Losavio et al., 2011).

Hereby, character traits play a role in how the event is experienced, processed, and evaluated. As elaborated earlier, the process and intensity of PTG are influenced by an individual's character and personality traits (Henson et al., 2021; Tedeschi & Calhoun, 2004). Despite limited research on PG, a similar effect of personality and character traits of an individual on the process and development of PG was found. A high level of self-esteem and high level of sensitivity has been shown to positively correlate with PG and work as a buffer for possible negative effects of DS (Dasch et al., 2008; Kashdan et al., 2004). Further, time for the individual to process the negative stressors, combined with active engagement in the process enhances PG (Losavio et al., 2011). Despite the findings of the aforementioned studies, research about DS and PG, as well as which character and personality traits might affect PG after DS, is still limited. Building upon the concepts of the shared core belief disruption and the potential role of buffers, occurring after traumatic events and DS, to further investigate the area of PG, it can be examined whether psychological constructs known to enhance PTG after traumatic events also exert a similar influence on PG after DS. One character trait shown to enhance PTG after traumatic events is self-efficacy (Mystakidou et al., 2014).

Self-Efficacy

The term self-efficacy (SE) describes an individual's perceived capability, ability, and confidence to perform in, and deal with situations and stressors (Schönfeld et al., 2016; Sharma & Rani, 2013). The level of SE within an individual influences the way they act, think, and feel, based on past experiences, perceived ability, and expected outcome (Mystakidou et al., 2014). SE is grounded in the Social Cognition Theory by Bandura (1997). In his theory, Bandura describes how behavior, personal factors, such as emotions and cognitions, and environmental factors determine human achievement and functioning, emphasizing humans' ability to control and manage their behavior (Bandura, 1997). According to Bandura (1997), SE is a crucial factor in controlling and managing behavior which determines whether someone thinks pessimistically or optimistically about a situation and their ability to execute suitable actions. SE also functions as a source of resistance, referring to and determining an individual's capability to regulate stressors (Schönfeld et al., 2016). A high level of perceived SE can alleviate anxiety by providing the individual with a sense of ability to cope with a stressor and to maintain that coping style (Mystakidou et al., 2014). SE boosts well-being and buffers mental health problems.

High SE was found to be correlated with high levels of subjective well-being, optimism, life satisfaction, and overall positive mental health (Schönfeld et al., 2016). SE is an important factor in psychological adjustments and coping strategies. Individuals displaying a high level of SE have shown to accept more challenging tasks, believe in their skills to manage and handle challenging situations in a calm manner, and have shown to be less disrupted by challenges and difficulties (Maddux, 2002; Sharma & Rani, 2013). Further, they tend to set higher goals and are more prone to stick to them (Sharma & Rani, 2013).

SE can be about someone's general belief in their abilities or domain-specific. A general belief in one's perceived ability and skills, covering a wide range of domains is called generalized self-efficacy (GSE). GSE is a universal construct, reflecting an inherited belief in all individuals (Sharma & Rani, 2013). This study will focus on GSE and how general self-efficacy affects PG after DS. The term self-efficacy will be used to describe the concept of GSE.

As previously mentioned, personality and character traits impact possible PG after DS. Based on similarities between PTG and PG, characteristics influencing PTG might also have an impact on PG. In recent studies, the effect of SE on PTG after traumatic events has been examined. Mystakidou et al. (2014) investigated the influence of SE on PTG in cancer patients, finding a high level of SE enhancing PTG among patients. Participants of this study showed higher adaptive skills and more control over thoughts, to decrease disturbing intrusive thoughts about their disease, resulting in less negative psychological outcomes (Mystakidou et al., 2014). Similar results have been found by Li et al. (2022) in PTG among burn patients, indicating higher SE contributes to more PTG. Participants with a higher level of SE displayed a more optimistic, positive attitude and behavior to control the negative impact of their traumatic event (Li et al., 2022). In a study by Schönfeld et al. (2015), the possible effect of SE as a buffer on the effect of daily stress on mental health was researched. The study was based on the impact positive character traits can have on mental well-being and that therefore, positive character traits, such as SE, help to buffer stress and other negative daily events. Findings revealed that internal processes and character traits, including SE, mediate the effect of stress on mental well-being. Since research regarding PG after negative daily events is limited, the association between SE on PG after DS has not been researched yet. Concludingly, SE has an effect on PTG leading individuals provided with the ability to cope, manage, and control stressful events, SE is theorized to increase PE.

Current Study

Previous studies have shown that DS can have a negative impact on an individual's mental health. However, depending on various factors, experiencing DS might also lead to PG (Losavio et al., 2011; Schönfeld, 2015). PG is a key component of positive mental well-being and self-actualization (Celik, 2015). In light of the advantages that PG can bring, more research in this area would be beneficial to understand the effect of DS and the process of PG. A high level of SE provides an individual with the ability to cope with stressful events, regulate stress, and think more optimistically about a situation (Bandura 1997; Schönfeld et al., 2016). Due to a similar process of belief disruption and requiring making sense of the experience, shared by PTG and PG, it can be assumed that factors enhancing PTG might benefit PG (Celik, 2015). SE has been shown to mediate the effect of stress on mental well-being, also entailing PG. Further, SE was found to increase PTG after traumatic experiences (Mystakidou et al., 2014). However, a possible effect of SE on PG after daily stressors has not been examined yet. Therefore, investigating the impact of self-efficacy on PG following DS could provide valuable insights into the mechanisms underlying PG and DS. This line of inquiry could contribute to a more comprehensive understanding of the factors that foster PG in the face of DS. To address this aim, the following research questions (RQ) were formulated:

RQ 1: To what extent is personal growth related to daily stressors within individuals?

RQ 2: How does self-efficacy moderate the relationship between daily stressors and personal growth within individuals?

Based on the RQs, the following hypotheses have been proposed:

Hypothesis 1: Daily stressors are positively associated with personal growth within individuals.

Hypothesis 2: Self-efficacy positively moderates the relationship between daily stressors and personal growth within individuals.

Methods

Design

To examine the fluctuation within each participant, contributing to the understanding of the process of daily growth, the Experience Sampling Method (ESM) is used. The intensive longitudinal design is a structured self-report diary research method, used to capture the participants' subjective experiences, moods, or symptoms in relation to their time and context. It

is a suitable approach to disentangle individuals' differences on a within-person and between-person level (Myin-Germeys et al., 2018; Myin-Germeys & Kuppen, 2021). In ESM studies, participants are asked to complete the same questionnaire multiple times per day over a relatively short period of time. The precise number of participants required questionnaires per day and the duration in total can vary in each study. By completing the questionnaire multiple times per day, a high amount of data is collected within a short period of time (Myin-Germeys & Kuppen, 2021). In the current study, the fixed signal contingent sampling method was used. With signal contingent sampling methods, participants will be provided with signals throughout the day, notifying them to fill out the questionnaires. With this sampling method, several data points per day can help to capture the variance within the participants' measurements (Mehl & Conner, 2013).

Participants

To gather participants, the convenience sampling method was used. Convenience sampling is a non-probability sampling method. Recruited participants are easy to reach, due to social or geographical proximity, availability, or willingness to engage (Nikolopoulou, 2022). For this study, the link to the questionnaire was distributed among fellow students of the researchers and published on the SONA system, a test subject pool of the University of Twente. Participants following the study via the SONA system were rewarded with one credit after participating. The inclusion criteria to participate in the study were having sufficient proficiency in the English language, being a student at the time of participation, and possessing a smartphone or laptop.

A response rate of a minimum of 30% was chosen. A total of 49 participants signed up for the study. Participants below a response rate of 30% ($N = 26$) were excluded from the data set, the remaining valid data included 23 participants. One participant ($N = 1$) did not complete the baseline questionnaire but reached a response rate > 30% and was therefore included in the study. For the final sample of those who filled out the baseline questionnaire ($N = 22$), 17 participants (77.3%) indicated a female gender and five indicated a male gender (22.7%). No participant indicated "non-binary" or "prefer not to say". The age ranged between 19 and 54 years ($M = 24.91$, $SD = 6.91$). It was noticeable that a majority of the participants were from Germany (81.81 %). Further sample characteristics about the gender and level of education can be found in Table 1.

Table 1

Sample Characteristics

Characteristics	*n*	Percentage	*M*	*SD*
Total	22			
Age			24.91	6.91
Gender				
Female	17	77.3		
Male	5	22.7		
Non-binary	0	0		
Prefer not to say	0	0		
Education				
Highschool	3	13.6		
Bachelor	15	68.2		
Master	3	13.6		
Other	1	4.5		
Nationality				
German	18	81.81		
Dutch	1	4.54		
Other	3	13.64		

Note. M = Mean; *SD* = Standard Deviation; Min = minimum score, Max = maximum score. Age is displayed in M and SD

Materials

Data for this study was collected together with multiple research projects, measuring different psychological constructs and their relationship with PG and DS. Within this paper, only materials relevant to this study will be elaborated on. This study consisted of two distinct questionnaires, a baseline questionnaire, and a daily questionnaire.

Tool

To conduct this study, the website and application Ethica was used. Ethica is a tool to collect and monitor data, commonly used for ESM studies since it allows real-time and real-world data collection (Ethica Blog, n.d.). It was chosen for this study to ease the participants'

access to the study by using the app, aiming to decrease participant burden (Myin-Germeys & Kuppen, 2021).

Baseline Questionnaire

Socio-demographic Data. At the beginning of the baseline questionnaire, socio-demographic data was collected. Participants were asked to indicate their age, gender, nationality, and highest academic level yet achieved.

Daily Questionnaire

Daily Stressors. In order to assess DS within the last hour, one item was selected from the ESM Item Respiratory (ESM Item Respiratory, n.d.). The item "Think of the most striking event or activity in the last hour. How stressful was this event or activity" was assessed on a 7-point Likert scale ranging from -3 (*Not at all)* to +3 (*Very much*).

Personal Growth. To measure personal growth two items were derived from the Posttraumatic Growth Scale (PTGS) and modified (Tedeschi & Calhoun, 1996). Both items, "In the last hour, I felt capable of handling difficulties" and "In the last hour, I felt that life is a continuous process of learning, changing and growth" were scored on a 7-point Likert scale from 1 (*Totally disagree*) to 7 (*Totally agree*). In the current study, the items showed a poor reliability ($\alpha = .54$).

Self-Efficacy. Items used to measure SE were derived from the Generalized Self-efficacy Scale (GSES) and modified to assess SE as a state and to align them with the other items (Schwarzer & Jerusalem, 1995). The items "In the last hour, I felt confident that I can deal efficiently with unexpected situations throughout the day" and "In the last hour, I felt like if I am in trouble, I could easily think of a solution", were assessed on a 7-point Likert scale, ranging from 1 (*Totally disagree*) to 7 (*Totally agree*). The items showed a good reliability ($\alpha = .84$).

Procedure

Prior to conducting the study, the study was examined and approved by the Ethics Committee of Behavioural, Management, and Social Science of the University of Twente (#230092). After signing up for the study on Sona or via a link, a registration code was sent to the participants, with which they could enter the study on Ethica. Participants provided online informed consent prior to starting the study (see Appendix A).

As previously elaborated, this study consisted of two distinct questionnaires. Participants start the study with a single-time baseline questionnaire, beginning with a repeated introduction

in the structure and duration of the questionnaire, followed by demographic questions about age, gender, nationality, and highest academic level achieved (see Appendix B). The baseline questionnaire took about 5 minutes to complete. Afterward, participants continued with the daily questionnaire (see Appendix B). Participants were notified by an auditory beep on their phones via the Ethica application and received this signal five times per day. The first signal was triggered at 10 AM. The second signal was triggered at 1 PM, followed by the third at 4 PM. The fourth signal was triggered at 7 PM. The last signal was triggered at 10 PM. After the beep, participants had one hour to complete the questionnaire before the session expired. Prior to the expiration of the session, participants were reminded by an additional beep, after 25 minutes and again after 40 minutes. Completing one questionnaire took 5 minutes. The full questionnaires can be found in Appendix B. Overall, the data collection took place from March 20, 2023, to April 17, 2023. Each individual study took 11 days.

Data Analysis

After the data collection, the baseline questionnaire and daily questionnaire were downloaded and transferred separately from Ethica to IBM SPSS Statistics version 25 (IBM Corp., 2017). Prior to the analysis, the data set was cleared and prepared.

A time variable was created for the remaining participants to sort their data points from the daily questionnaires. For the measures of SE and PG, a total score was created. The decision was made to work with total scores based on the scoring system of GSES and PTGS, from which the items were derived and modified (Tedeschi & Calhoun, 1996; Schwarzer & Jerusalem, 1995). Further, the item measuring DS was recoded, to eliminate negative values. The original scoring -3 to 3 was transformed into a scale of 1 to 7. The Person Mean Centered (PMC) scores of DS, SE, and PG were calculated. To do so, first, the Person Mean (PM) of each variable's total score was calculated and subtracted from the scale's total score. The PMC score is used to assess within-person differences (Myin-Germeys & Kuppens, 2022). Little's Missing Completely at Random (MCAR) test was conducted to check whether data was missing at random (Little, 1988). Afterward, the descriptives of the participants' demographics were assessed, as well as the mean, standard deviation, maximum, and minimum scores of all state measures total scores were calculated. Line plots and box plots of participant's DS, PG, and SE were created for a visual representation of the data.

In order to conduct the analysis, a linear mixed model (LMM) was used. LMM is an often-used data analysis method to deal with longitudinal or clustered data (Gueorguiva, 2001). Further, LMM allows for disentangling multilevel data and working with the variables of interest, showing the variability of data (Myin-Germeys & Kuppens, 2022). The covariance type Autoregressive Structure 1 (AR1) was used for this analysis, suggesting a decrease in correlation with an increase in time (Barnett et al., 2010). In all analyses, PMC scores of the variables were used. To examine the first research question "*To what extent is daily stress associated with personal growth within individuals?*" PG was treated as a dependent variable and DS as a fixed factor. The participant variable was included as a subject, to take nested structure into account. To answer the second research question "*How does self-efficacy moderate the relationship between daily stressors and personal growth within individuals*", another LMM was run. DS and PG were treated as fixed factors, SE was used as a dependent variable. To investigate a possible moderation, an interaction effect of the fixed factors was included. Again, the participant variable was included as a subject, to take a nested structure into account.

Results

Preliminary Analysis

Little's Missing Completely at Random Test (MCAR)

As the MCAR test was conducted, the missing data could be categorized as missing completely at random $x^2(5) = 5.44$, $p = .36$). Hence, the null hypothesis claiming that data is not missing at random can be rejected and no additional measures to deal with missing data had to be taken (Little, 1988).

Descriptive Statistics

The calculated means and standard deviations of all measures are presented in Table 2. On average the participants scored high on PG and SE. Overall, the scoring on DS was low. As this study investigates the within-person differences, each participant's mean and standard deviation were assessed (see Table 3).

Table 2

Minimum (Min), Maximum (Max), Means and Standard Deviations (SD) in the Final Sample (N = 23)

Variable	*Mean*	*SD*	Min (minimum scale score)	Max (maximum scale score)
State Personal Growth	9.09	2.18	2 (2)	14 (14)
State Self-Efficacy	9.20	2.26	2 (2)	14 (14)
State Daily Stressor	2.95	1.77	1 (1)	7 (7)

Note. M = Mean; *SD* = Standard Deviation; Min = minimum score, Max = maximum score

Table 3

Mean and Standard Deviation of Total Scores of each Participant of Daily Stressor, Personal Growth and Self-Efficacy

Participant	Daily Stressor		Personal Growth		Self-Efficacy	
	M	SD	M	SD	M	SD
1	4.22	1.12	9.04	1.54	8.53	1.27
2	4.39	1.5	9.44	1.54	8.61	1.56
3	3.89	1.66	6.76	1.98	6.06	1.80
4	4.63	1.52	9.41	1.76	10.	1.66
5	4.39	1.14	10.41	.84	9.83	.98
6	4.59	1.8	9.29	1.42	9.09	1.56
7	5.3	1.49	10.84	1.83	9.37	1.64
8	4.73	1.88	8.27	2.08	7.88	2.02
9	4.63	1.72	9.35	2.88	8.63	2.48
10	4.39	1.34	8.26	2.54	7.09	2.3
11	4.48	1.5	9.8	1.64	9.6	1.65
12	5.16	1.34	8.79	1.47	9.0	1.41
13	5.08	1.83	9.69	1.39	11.11	1.75
14	4.48	1.53	7.59	3.37	8.7	2.96
15	3.96	1.7	9.0	1.19	9.6	1.35
16	3.79	1.61	8.28	1.71	8.39	2.17
17	4.46	2.26	10.58	1.93	13.21	1.18
18	4.43	1.17	7.72	1.5	8.6	1.57
19	4.84	1.78	10.25	2.52	10.73	2.68
20	4.23	1.38	8.68	1.35	8.87	1.34
21	4.25	1.84	9.31	2.57	9.69	1.45
22	4.7	1.15	7.97	1.72	8.32	1.27
23	3.82	1.98	10.21	2.5	9.96	2.44

Note. M = Mean; *SD* = Standard Deviation; Min = minimum score, Max = maximum score

Visualizations of Variation

Boxplots were created to visualize the distribution and variation of total scores among each participant in DS, PG, and SE. Participants encountered high variation in DS, within each participant and between the mean scores of each participant (see Figure 1). Fewer fluctuations can be observed in the variation of PG and SE (see Figure 2 and Figure 3). Participants showed less variance in PG. As an exception, more variance can be seen in the scores of participant 14, participant 21, and participant 22 (see Figure 2). Little variance within and between participants can be seen in their SE scores (see Figure 3). It can be observed that participant 8 and participant 9 showed high variation in all three variables. Participants 13 and 20 showed high variation in DS, but low variation in PG and SE.

Figure 1

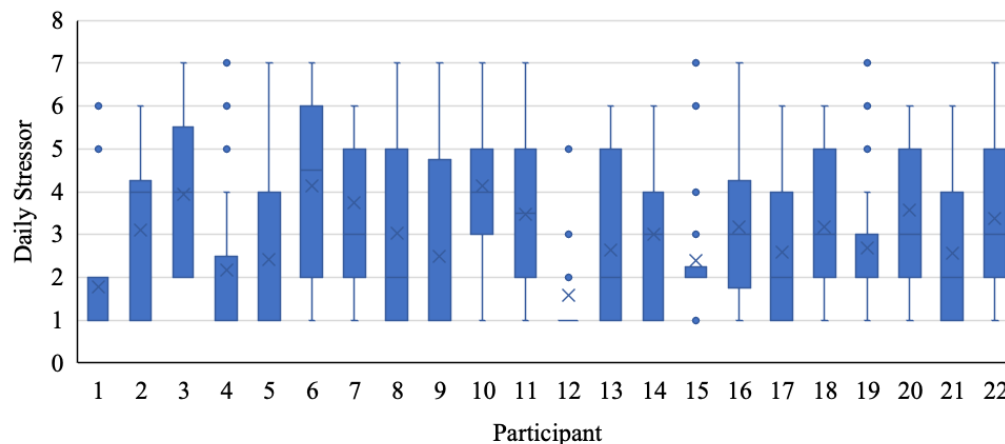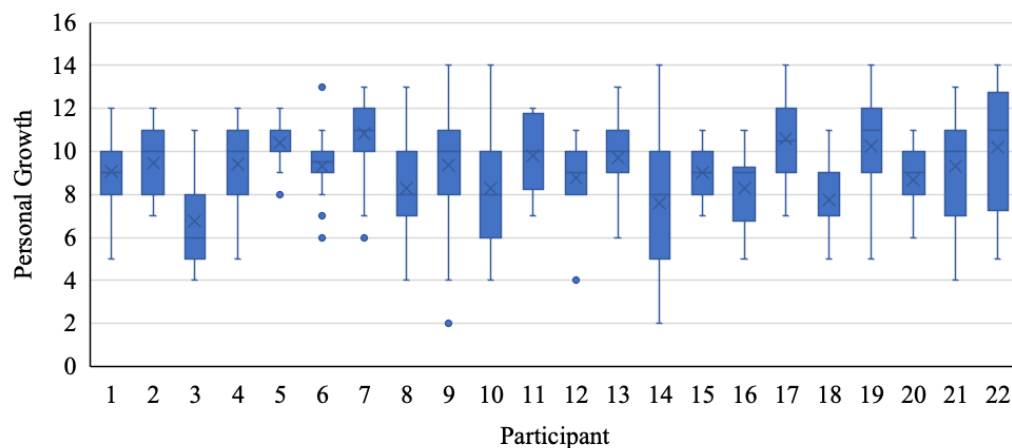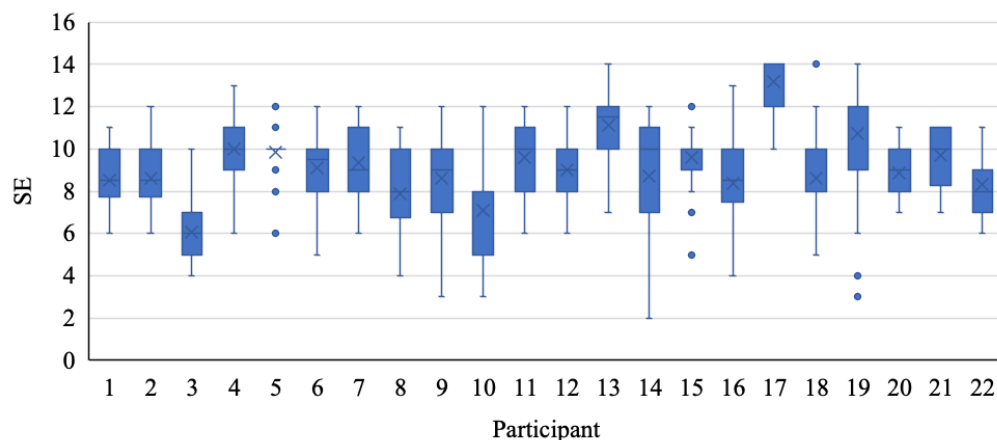*Variation of Experiencing Daily Stressor Among Each Participant*

Figure 2

Variation of Experiencing Personal Growth Among Each Participant

Figure 3

Variation of Experiencing State Self-Efficacy Among Each Participant

Visualizations of Within-Person Fluctuation

       Line Plots were created to visualize data of individual cases. The following visualizations display the distribution of the PMC score of selected participants with a high response rate (3 and 11) among all 50 time points and show fluctuations over time (see Figure 4 and Figure 5). Both figures demonstrate how the PMC scores of DS, PG, and SE moved in the same direction, indicating a correlation between all three variables. Fluctuations can be seen in scores of all the variables, with the highest fluctuations in SE. Participant 38382 showed higher fluctuations within the time points. Despite moving in the same direction, the PMC score of SE showed the highest variance, ranging from -8 to 10. The lowest variance can be found in DS, ranging from -3

to 3 (see Figure 4). Participant 62667 showed fewer differences between the three variables. The variance within the PMC scores of DS was lowest, ranging from -3 to 2, and the variance within the PMC scores of state SE was highest, ranging from -5 to 7 (see Figure 5).

Figure 4

Distribution of PMC Daily Stressor, PMC State Personal Growth and PMC State Self-Efficacy of Participant 3
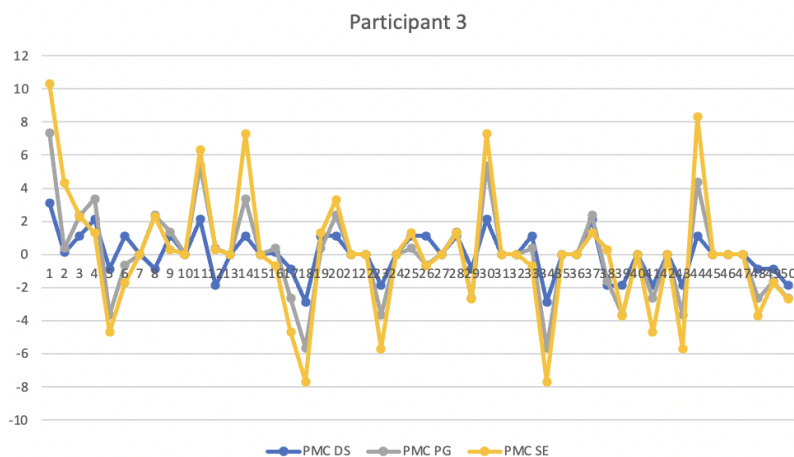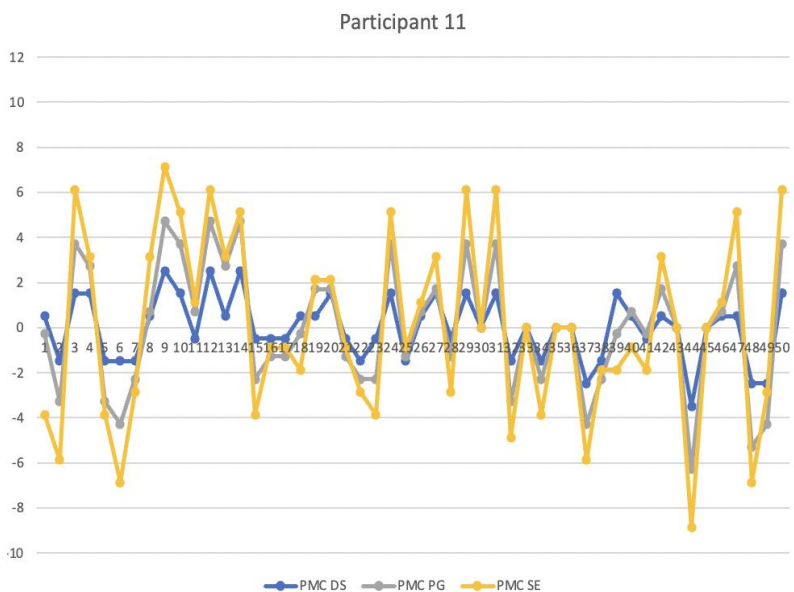

Figure 5

Distribution of PMC Daily Stressor, PMC State Personal Growth and PMC State Self-Efficacy of Participant 11

Linear Mixed Model

Association between Daily Stressors and Personal Growth

In order to test the first hypothesis *daily stressors are positively associated with personal growth within individuals*, a LMM with the PMC score of DS and PMC score of PG was conducted. Table 4 displays the estimated fixed effects of the relationship between DS and PG. It can be seen that DS is positively significantly associated with state PG ($\beta = .50, p < .001$). This result indicates that the experience of DS is positively associated with the experience of PG, supporting the hypothesis.

Table 4

Estimates of Fixed Effects of Daily Stressors on State Personal Growth Within Individuals

Parameter	ß	SE	df	t	Sig	95% CI Lower Bound	Upper Bound
Intercept	.003	.06	708	0.04	<.001	-.13	.13
Daily Stressor	.50	.04	708	11.93	< .001	.42	.59

Note. SE= Standard Error, CI= Confidence Interval, Dependent Variable: State Personal Growth.

Moderation of Self-Efficacy on Daily Stressors and Personal Growth

To test the second hypothesis *Self-efficacy positively moderates the relationship between daily stressors and personal growth,* another LMM was run. The outcome revealed a positive significant association between DS and PG ($\beta = .15, p < .001$), and a significant main effect between SE and PG ($\beta = .64, p < .001$). The estimated fixed effects are displayed in Table 5. However, no significant effect of SE as a moderator on the association between DS and PG was found ($\beta = -.02, p = .19$). Hence, SE seems to not moderate the relationship between DS and PG, and the hypothesis was rejected.

Table 5

Estimates of Fixed Effects of the Moderation of State Self-Efficacy on Daily Stressors and State Personal Growth Within Individuals

Parameter	ß	SE	df	t	Sig	95% CI Lower Bound	Upper Bound
Intercept	.03	.06	705	.48	.63	-.09	.14
Daily Stressor	.15	.04	705	3.87	<.001	.07	.22
State Self Efficacy	.64	.03	705	18.53	<.001	.57	.7
Daily Stressor * State Self Efficacy	-.02	.02	705	-1.3	.19	-.05	.01

Note. SE= Standard Error, CI= Confidence Interval, Dependent Variable: State Personal Growth.

Discussion

This study aimed to examine the relationship between DS and PG and a possible moderation effect of SE as a state measurement of the relationship between DS on PG. For this, the longitudinal research design ESM was used, in order to examine possible within-person fluctuations and gain a better understanding of possible underlying factors. DS and PG are not yet extensively researched topics, and no study to date has examined the influence of SE on the relationship between DS and PG within individuals. In the course of this study, it was found that DS seems to increase PG within individuals. However, SE did not have a significant moderation effect on the relationship between DS and PG.

Main Findings

Examining the relationship between DS and PG, a significant positive effect of DS on PG was found. Thus, participants reporting higher stress levels also reported higher growth levels in daily measurement. This finding supports the hypothesis that daily stressors are positively associated with personal growth within individuals. This hypothesis was built upon previous research finding that growth can occur after negative daily events and aligns with the findings of previous studies (Losavio et al., 2011). Park et al. (1996) found that growth is not only related to

major or traumatic life events but also to daily stressors. It was suggested that individuals reporting growth after stressful daily events have different coping mechanisms, influencing the level of growth. Further, Tedeschi & Calhoun (2004) suggested that not the traumatic experience itself leads to growth, but rather the process and evaluation of any experience. Hence, growth does not require a traumatic experience and can occur after negative daily events.

Second, a possible moderating effect of SE on the relationship between DS and PG was examined. Contradicting to what was expected, SE did not moderate the effect of DS on PG. A moderation effect was suggested based on previous studies finding a high level of SE increases an individual's belief in their skills and factual ability to cope with stressful situations. Additionally, SE benefits PTG and was thought to benefit PG as well, due to the shared process of core belief disruption. Therefore, SE was thought to alleviate PG after DS. Further, even though findings did not reveal a moderation effect, an association between SE and PG can be suggested. One possible explanation for the unexpected findings could be that, even though SE played a factor in the growth process, another factor played a more incisive role, undermining the effect of SE. Other contextual factors might be various coping strategies or individual characteristics, such as social support (Schwarzer & Knoll, 2007). In a study by Schönfeld (2015), SE has been shown to mediate the effect that stressful daily events have on an individual. Therefore, the effect of SE on the relationship between DS and PG might not be a moderating effect, but a different form of association between them could be investigated further.

Strengths and Limitations

This study contributes to enhancing insight into the process of PG and its relationship with daily stressors and potential factors affecting this process. Overall, the field of PG has not been extensively researched. It is considered beneficial to gather more understanding of the process and influential factors of PG since it has been shown to positively affect an individual's well-being by improving mental health and increasing motivation (Celik, 2015). Using ESM as a research design of this study provides a unique insight into the within-person differences of participants. The retrospective bias could be decreased through five measurement points per day and timely completion of daily questionnaires (Myin-Germeys et al., 2018). Reducing retrospective bias is especially important when measuring daily stressful events since stressful events are often memorized more positively than they actually occurred, leading to a less stressful perception of an event in the long run (Walker et al., 2003). Further, ESM allowed to

capture fluctuations within one participant throughout a day, facilitating a more comprehensive understanding of the psychological constructs (Myin-Germeys et al., 2018). By choosing Ethica as a tool to participate in the study, participants were able to fill out the questionnaires on their mobile phones, enabling a decrease in participant burden. Mobile phone users have been shown to be attentive to messages for an average of 12 hours per day, allowing for timely responses and filling out the questionnaire. Therefore, by using their mobile phone for this study, their daily routine was less disrupted, and the survey was more accessible for the participants (Dingler & Pielot, 2015; Van Berkel et al., 2017).

Despite the strengths of this study, some limitations can also be noted. First, the participants' response rate in this study was lower than suggested for ESM studies. A response rate of 50% is suggested by researchers (Van Berkel et al., 2017). However, a response rate of 30% was chosen for this study. This choice was based on the overall low response rate among participants and to avoid a smaller sample size. A prevalent disadvantage of ESM is the participant burden, which increased through several measurement points per day and the long duration of this study (Myin-Germeys & Kuppen, 2021). Additionally, despite the chosen response rate of 30%, data from 27 out of 49 participants had to be excluded. The low response rate of this study could be an indicator of a high participant burden by asking the participants to fill out the questionnaire five times per day over 10 days.

Due to the sample strategy of convenience sampling, the majority of the participants were female German university students. Therefore, results should be generalized cautiously, as the sample might not represent the population adequately (Jager et al., 2017). Participants identifying as female are known to report a higher level of stress than participants identifying as male (Matud, 2004). Further, students often experience daily stress in the form of self-imposed pressure, the changes occurring in their lives, and social pressure. In comparison, the elderly are more concerned about their physical health (Schafer & Shippee, 2010). Given those differences in perceived stress and the source of stressors, results might differ using a more variant sample.

Another noticeable limitation of this study is the consideration of how reliable the chosen items measured the constructs. Based on Van Berkel's (2017) suggestion to keep the number of items measuring one construct as low as possible, to decrease participant burden, only one or two items were chosen to measure one construct. Therefore, it can be criticized how accurately the items measure the construct. This can be seen especially with the poor reliability of the items

measuring PG ($\alpha = .54$), indicating that the two items do not measure the same construct (Tavakol & Dennick; 2011). It could be considered to include more items measuring PG to increase measurement reliability. Nevertheless, the participant burden should be kept as low as possible (Van Berkel, 2017).

Future Research and Implications

The findings of this study suggested that encountering daily stressors has the potential to evoke personal growth in individuals. Personal growth has shown to be an essential factor in psychological well-being, such as self-actualization and basic need satisfaction. It is beneficial to understand that not only traumatic events can elicit growth, but that growth can occur after daily stressful events (Losavio et al., 2011; Schönfeld, 2015). The field of PG after DS, its process and contributing factors could be further explored. Further, it can be looked into ways to increase PG after DS. The exercise positive reframing could be beneficial. In this exercise, negative or stressful events will be reframed in a more positive context by bringing a possible upside of the event or a learned lesson to the foreground. In past studies, positive reframing has been shown to increase life satisfaction and growth among participants after experiencing negative events (Flanigan et al., 2021; Stoeber & Jansen, 2011). Therefore, implementing the exercise of positive reframing might foster the process of PG and can be considered as a possible intervention.

Even though the results of this study revealed no significant moderation effect of SE on the relationship between DS and PG, an association between the three variables was found. Therefore, it could be investigated whether SE might influence PG in a different form, such as a mediator. As indicated earlier, different factors might have influenced the process of PG after DS. In future studies, potential influential factors could be examined. Keeping in mind the similarities between PTG and PG, it can be suggested to research personality and character traits that also have a beneficial effect on the process of PTG, such as agreeableness or level of spirituality (Henson et al., 2021; Tedeschi & Calhoun, 2004). Next, coping strategies are suggested to influence PG after DS and could be a topic of interest in future studies (Park et al., 1996).

Based on the low response rate, indicating a high participant burden, it is suggested to lower the participant burden in future ESM studies. Van Berkel et al. (2017), suggested implementing a reward system for participants, for example with vouchers. Alternatively, visualizing the progress of responses in a chart might help to motivate participants. In this study,

students participating via the SONA system were rewarded with one credit. However, not all participants joined via the SONA system and were therefore not rewarded. A more consistent reward system might increase the response rate of participants.

As explained in the context of limitations, the sample of this study was not diverse, consisting of mostly female students. This could have an impact on the results, due to gender differences and various major stress factors between age groups (Matud, 2004; Schafer & Shippee, 2010). To address this limitation and to enhance the generalizability of findings it is recommended to use a different sampling method, aiming for a more diverse sample.

Conclusion

This study contributed to the research in the field of personal growth after daily stressors and possibly influencing personality and character traits. Experiencing daily stress can lead to negative consequences for an individual. Various factors, such as personality and character traits can influence the effect of daily stress on an individual and might increase the process of PG. Contributing factors leading to personal growth have not been studied much yet. By conducting this study, more insight into the field of personal growth was gained. The importance can be seen in the positive impact personal growth can have on an individual's mental well-being. The findings of this study indicated that daily stressors significantly increased personal growth among the participants. SE seems to not moderate the effect of daily stressors on personal growth. More research in the field of PG after DS and possible influencing factors is needed to gain a better understanding of this field.

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Appendix A
Informed Consent

This study focuses on responses to daily stressors and consists of two parts. In the first part, you have to fill out some general questionnaires. You only need to do this once and it takes about 20 minutes. The second part of the study lasts for 10 days. Per day, you will get 5 notifications to complete a short questionnaire. Completing this short questionnaire will take about 5 minutes.

Your participation in this study is completely voluntary and all your responses are treated anonymously. None of the responses will be connected to identifying information and wouldn't be shared with third parties. Data will only be used for statistical analyses. However, you can withdraw from the study at any time! By simply stopping answering the daily questions without the need to give any reasons.

If you would like to have further information about the research, now or in the future, feel free to contact *Mirjam Radstaak* at:

m.radstaak@utwente.nl.

Appendix B
Questionnaires

Introduction

Hello,

Thanks again for signing up for this study. We hope it's going to be a pretty interesting time for you.

This study has two parts. The first part consists of completing general questionnaires. This will take about 20 minutes. The second part of the study starts tomorrow and lasts for 10 days. Per day, you will get 5 notifications to complete a short questionnaire. Completing this short questionnaire will take about 5 minutes.

You can now start the first part. It involves some questions about demographics and some general questions. You only need to complete these questions once.

Are you ready?

Baseline Measurement

1. What's your gender?

       O Female

       O Male

       O Non-binary/Third gender

       O Prefer not to say

2. What's your age?

3. What's your nationality?

       O Dutch

       O German

       O Other

4. What is the highest degree or level of school you have completed? If currently enrolled, mark the highest degree already received.

     O High school graduate

     O Bachelor's degree

     O Master's degree

     O Doctorate degree or higher

     O Other

5. What is your Sona ID? Fill in your personal number.

Please read the items carefully and choose the answer that applies most to you.

The following questions are about posttraumatic growth. For each statement, choose the answer that fits you best.

     I changed my priorities about what is important in life.

     I have a greater appreciation of the value of my own life.

     I am able to do better things with my life.

     I have a better understanding of spiritual matters.

     I have a greater sense of closeness with others.

     I established a new path for my life.

     I know better that I can handle difficulties.

     I have a stronger religious faith.

     I discovered that I'm stronger than I thought I was.

     I learned a great deal about how wonderful people are.

Daily Momentary Assessment
Hello,

It's time again for your daily questions.

Let's begin and tell us how you feel at the moment.

     Think of the most striking event in the last hour. How stressful was this event?

     In the last hour, I felt confident that I can deal efficiently with unexpected situations throughout the day

     In the last hour, I felt like if I am in trouble, I could easily think of a solution

In the last hour, I felt capable of handling difficulties.

In the last hour, I felt that life is a continuous process of learning, changing and growth.

Good job!

Thank you for your response, we appreciate it.

See you soon.