













ORIGINAL ARTICLE

Psychological need fulfillment as a source of resilience: Its protective role in concerns and symptoms of anxiety and depression during the COVID-19 pandemic

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Abstract

The essential role of the psychological needs for autonomy, competence, and relatedness in well-being has been demonstrated convincingly. Yet whether their fulfillment also serves as a source of resilience in the face of adversity has received limited attention. A longitudinal sample of Belgian citizens ($N = 1869$; $M_{\text{age}} = 56.23$, 68% female) completed an online questionnaire on 13 occasions between April 2020 and April 2022 during the COVID-19 crisis. Multilevel analyses showed that need fulfillment, both at the between- and within-person level, related negatively to concerns, even after controlling for exposure to personal risks. Further, the association between concerns and changes in symptoms of depression and anxiety was dampened when people reported higher need fulfillment compared with others (i.e. between-person level) or when they reported periodically more need fulfillment than usual (i.e. within-person level). This moderation effect occurred on top of the systematic negative main effect

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of need fulfillment on symptoms of anxiety and depression. Psychological need fulfillment serves as a resilience factor (a) by reducing concerns in the face of adverse events (i.e. an appraisal effect) and (b) by mobilizing resources that help individuals to deal better with concerns (i.e. a coping effect). Theoretical and practical implications of the resilience effect of need fulfillment are discussed.

KEYWORDS

COVID-19, psychological needs, self-determination theory, well-being

INTRODUCTION

Self-Determination Theory (SDT; Ryan & Deci, 2017; Ryan et al., 2022) postulates three basic psychological needs that are essential for individuals' mental health and psychosocial development, that is, the needs for autonomy, relatedness, and competence. Autonomy satisfaction denotes the experience of choice, psychological freedom, and volition, whereas autonomy frustration involves experiences of pressure and inner conflict; relatedness satisfaction denotes the experience of social connection and warmth, whereas experiences of loneliness and exclusion characterize relatedness frustration; and competence satisfaction refers to the experience of effectiveness and mastery whereas competence frustration denotes experiences of failure and inadequacy. These psychological needs have been characterized as essential, pervasive, and universal (Vansteenkiste et al., 2023), meaning that their satisfaction is required for individuals to thrive regardless of culture, age, gender, and socio-economic background (e.g. Yu et al., 2018). In contrast, need frustration predicts problem behavior and even psychopathology (Vansteenkiste & Ryan, 2013).

Prior research, some of which has been summarized meta-analytically (Ryan et al., 2022), has convincingly shown that higher satisfaction and lower frustration of these needs contributes to mental health (Martela & Sheldon, 2019), both at the level of between-person differences (DeHaan et al., 2016; Verstuyf et al., 2013) and at the level of within-person variation across time (e.g. Tian et al., 2014). Whereas some studies examined the separate role of need satisfaction and need frustration, other studies made use of an overall index or composite score of need fulfillment, thereby aggregating all three needs and subtracting need frustration from need satisfaction (Campbell et al., 2018; Patrick et al., 2007; Reis et al., 2000).

Apart from contributing to mental health, these psychological needs are thought to play a protective role in the face of adversity (Vansteenkiste & Ryan, 2013). Consistent with this notion, need fulfillment has been found to predict individuals' adjustment during the COVID-19 crisis (Datu & Fincham, 2022; Müller et al., 2021; Šakan et al., 2020), a period associated with increased threat of different kinds (Brühlhart et al., 2021). Indeed, need fulfillment served as a source of well-being and protected against ill-being among different age groups, including teenagers (Levstek et al., 2021), students (Vermote et al., 2023), parents (Schrooyen et al., 2021) and the elderly (Tang et al., 2020). Experiences of need satisfaction were found to be critical to

understand the functioning of students during on-line education (Pelikan et al., 2021) and of employees during prolonged teleworking in times of lockdown (Brunelle & Fortin, 2021).

Although such work confirms the notion that need satisfaction fosters mental health, it does not provide evidence for the presumed resilience-fostering role of need satisfaction during distressing times. Therefore, the purpose of the present study is to examine this issue by examining (a) whether need fulfillment is implicated in individuals' appraisals of distressing events and (b) whether need satisfaction strengthens people's capacity to deal with encountered concerns during the COVID-19 crisis. In addressing the resilience-fostering role of need satisfaction, we accounted for the sociodemographic profile of individuals, as younger, female, single, lowly educated individuals as well as those who have more comorbidities were found to report greater concerns and more distress during the crisis (e.g. Horesh et al., 2020).

The resilience-fostering role of need fulfillment

According to SDT's organismic viewpoint on human nature (Ryan & Vansteenkiste, 2023), people are inclined to organize their lives in the service of improved need fulfillment (Laporte et al., 2021). This natural tendency to seek need-fulfilling experiences is highly functional because such experiences contribute not only directly to better mental health, but may also protect people better against events that threaten their mental health. Need fulfillment is conceptually considered to foster a resilient response (Vansteenkiste & Ryan, 2013) because it energizes individuals to mobilize adaptive and flexible cognitive-behavioral responses to distressing and perturbing events.

Consistent with other conceptualizations of resilience (Hartigh & Hill, 2022; Troy et al., 2023) and classic models of stress regulation and coping (Lazarus & Folkman, 1984), the resilience promoting function of need fulfillment would manifest in two different ways. First, there is individuals' ability to maintain a positive outlook on events despite confrontation with potential stressors (Bryan et al., 2019). Need fulfillment would then elicit more favorable or benign appraisals of such stressors (Weinstein & Ryan, 2011). When faced with similar events, people with varying levels of need fulfillment are thought to experience varying levels of concerns because they interpret the events differently in terms of severity and threat. Second, even when events are experienced as distressing, need fulfillment would contribute to more constructive cognitive-behavioral responses to these concerns, thus allowing people to 'bounce back' in the face of adversity and buffering the mental health costs that come along with the concerns (Vella & Pai, 2019). Research on the resilience-fostering function of need fulfillment has strong potential for prevention programs, thereby strengthening individuals' coping with adversity. However, to the best of our knowledge, only indirect evidence has been gathered.

Research on the resilience-fostering role of need fulfillment

As regards its role in the appraisal and experience of adverse events, need fulfillment was found to yield negative relations with threat appraisals during distressing circumstances, such as the experience of stress during exams (Campbell et al., 2018), job insecurity (Knežević & Krstić, 2019), traumatic circumstances (Lera & Abualkibash, 2022) and the COVID-19 pandemic (Dursun et al., 2022). Conversely, need fulfillment has been found to predict a more positive outlook on life and the perceived beauty of the environment (Weinstein et al., 2013).

Unfortunately, the few studies to date that examined the role of need fulfillment in individuals' appraisal of events did not take into account the actual severity and frequency of these risks. Perhaps the negative associations demonstrated between need fulfillment and threat appraisals were due to a lower occurrence of risks among people who experience greater need fulfillment. Stronger evidence can be provided by considering the actual events people are confronted with. If need fulfillment still relates to people's experience of these risks, holding constant the nature and number of risks people face, we can determine with greater certainty that need fulfillment indeed colors people's interpretation of encountered risks.

The more concerns people report, the more they are at risk for symptoms of anxiety and depression (e.g. Qiu et al., 2020), and distress (e.g. Leng et al., 2021). However, people differ in the extent to which concerns affect their mental health. Psychological need fulfillment is a candidate mitigating factor because it may provide people with sufficient psychological energy to deploy adaptive coping responses (Skinner & Edge, 2002) and emotion regulation strategies (Benita et al., 2020; Brenning et al., 2022), thereby switching flexibly between these responses and strategies depending on situational demands.

Preliminary evidence for the resilience-fostering role of need satisfaction comes from prior self-report studies, which reported a positive association between the basic needs and resilience (e.g. Desrumaux et al., 2023; Neufeld et al., 2020). To the best of our knowledge, one study directly examined to what extent people's level of need fulfillment modified the effects of concerns on their mental health. Using data collected during the COVID-19 pandemic, Vermote et al. (2022) showed that the positive association between concerns and depressive symptoms was buffered at higher levels of need satisfaction. However, this effect was demonstrated for only one outcome and only at the level of between-person differences.

Present research

The assumption that the psychological needs are beneficial for people's well-being, a core proposition in SDT, has been strongly supported in the literature. However, little research to date has systematically examined their resilient role in the face of adversity. The current study extends this small body of work on the resilience-fostering role of need fulfillment by examining the role of need fulfillment as a factor that, first, allows people to preserve a benign interpretation of adverse circumstance (Objective 1) and, second, that mitigates the negative impact of concerns on symptoms of anxiety and depression (Objective 2). The resilience-enhancing role of need fulfillment could be inferred from such findings, which would suggest that, congruent with the viewpoint on susceptibility, that "a better than expected adjustment to difficult circumstances" (p. 2, Galli & Gonzalez, 2015).

To capture more comprehensively and more dynamically the assumed protective role of psychological need fulfillment, intensive repeated assessments of individuals' experiences of concerns and both symptoms of anxiety and depression are needed (Dunkley et al., 2014). Using such data, it is possible to examine the moderating role of need fulfillment not only at the level of (relatively stable) between-person differences but also at the level of within-person variation across time. Such a within-person association between concerns and both symptoms of anxiety and depression would indicate that people suffer more if they go through a period of elevated concerns, an effect that would be diminished if people experienced elevated need fulfillment in such a period.

To test the resilience-fostering role of resilience, the following two hypotheses were tested. First, it is examined whether need fulfillment is related to individuals' experiences of concerns even when taking into account their exposure to personal risks (Hypothesis 1). If the negative association between need fulfillment and concerns holds, it goes together with lower experiences of concerns than can be expected given the risks they are confronted with. Accordingly, such an association would indicate that need fulfillment contributes to a more positive appraisal of the events that happen to them, thereby showing maintenance of a positive outlook on events in spite of encountered stressors. Next to a set of sociodemographical variables (i.e. age, gender, civil status, comorbidity, and education level; e.g. Horesh et al., 2020), we considered *personal* risks, such as being infected or hospitalized personally or witnessing infections in one's immediate social environment. To the extent that the negative association between need fulfillment and concerns (controlled for actual personal risks) holds, it could be said to have a consistent positive effect on individuals' appraisals.

Second, we examined whether need fulfillment would buffer associations between experienced concerns and both anxiety and depression symptoms. If need fulfillment indeed plays a resilient role, then associations between concerns and symptoms of anxiety and depression should be less pronounced when people experience higher levels of need fulfillment (Hypothesis 2). We examined this potentially buffering role both across multiple levels. First, at the between-person level, moderation would indicate that those people who experience greater overall concerns across the period of investigation report lower symptoms of anxiety and depression, relative to other people, when they also experience comparatively greater need fulfillment (Hypothesis 2a). At the within-person level, this would indicate that people who experience greater need fulfillment during a given period are less susceptible to the effects of periodic concerns on anxiety and depression symptoms during that particular period (Hypothesis 2b). The cross-level interactions examine whether those being highly concerned, across the entire period, would benefit from a need-fulfilling period in terms of higher symptoms of anxiety and depression, or to what extent those having high overall need fulfillment are less susceptible to more concerning periods (Hypothesis 2c). Examining these dynamics within and across different levels of analysis has both theoretical and applied value, because experiences of need satisfaction are susceptible to change and can be targeted through interventions or counseling (e.g. Laporte et al., 2022).

METHODS

Participants and procedure

From the first day of the Belgian lockdown in March 2020, our team launched an online questionnaire through social media platforms and newspapers, advertised as a study on how people experienced the pandemic period. The introduction of the questionnaire was followed by an informed consent in which we emphasized that participation was voluntary, that people could quit anytime without negative consequences, and that data would be handled confidentially. Also, we explained that a question would be provided assessing people's interest in participating in follow-up surveys, for which we would need their e-mail address to be contacted. Here, we stressed that no direct link between one's personal data and responses to the survey would be available, but only with the intermediate step of a pseudonymized code. Also, some people who did not fill out the initial questionnaire completed the later surveys because we made each of

our surveys available online to anyone who was interested to participate. In this way, both new people and people invited longitudinally because they had completed one of the previous surveys participated at each time point. Participants were able to unsubscribe from being contacted again. We sent the follow-up surveys on crucial moments in the crisis, like the announcement of new measures or a strong change in the hospitalization numbers. An overview of the 13 different phases in the study can be found in Table S1, with information about the epidemiological and crisis-related situation in each phase. The procedure used in this study was approved by the ethics committee of Ghent University (nr. 2020/37).

In total, 1869 individuals participated in nine follow-up surveys or more (with 13 participations being the maximum). This minimal number of nine participations was chosen deliberately as we aimed to have a sufficient number of data points in each of the phases of the COVID-19 crisis (n_{range} : 874–1869). The participants selected for this study had a mean age of 56.23 years (range: 18–86) and were mainly female (68%). In total, 68% had a partner and had 0.17 comorbidities on average (range: 0–4). In terms of the educational level, 30.3% had no graduation or a secondary school graduation, 42.8% had a Bachelor's degree, and 26.9% had a Master's degree.

Measures

Before starting the main questionnaire, we assessed a set of continuous (i.e. age, education level, and comorbidities) and categorical (i.e. gender and civil status) sociodemographic variables.

Risk factors

To assess people's personal risks, we summed how many of the following events occurred for participants in the previous week: (1) consultation with a doctor (physically or online), (2) mandatory isolation, (3) a diagnosed COVID-19 infection, (4) hospitalization due to a COVID-19 infection, (5) undergoing a test for possible COVID-19 infection, (6) the experience of COVID-19 related symptoms, (7) living with a person having a COVID-19 infection, (8) taking more than four (types of) medicine on a daily base. Each event was presented in a dichotomic way (0 = not occurred; 1 = occurred).

Self-reported concerns

Following the item stem (i.e. "In the past week during the corona crisis ..."), participants were asked to indicate their concerns (e.g. "I was concerned about ...") with regard to their personal health, the health of significant others, and the situation (Chen, Van Assche, et al., 2015). Each item was rated on a scale ranging from 1 (*not at all true*) to 5 (*totally true*). The internal consistency was acceptable both at the between-person level and at the level of within-person variation ($\alpha_{\text{between}} = .86$; $\alpha_{\text{within}} = .65$; $\omega_{\text{between}} = .87$; $\omega_{\text{within}} = .63$).

Psychological need fulfillment

Participants completed the 12-item version of the Basic Psychological Need Satisfaction and Need Frustration Scale (BPNSNFS; Chen, Vansteenkiste, et al., 2015; Mabbe et al., 2018), with the items being formulated with reference to the preceding week (i.e. “In the past week during the corona crisis ...”). On a scale from 1 (*not at all true*) to 5 (*totally true*), items assessed both the satisfaction (6 items) and the frustration (6 items) of the psychological needs for autonomy, relatedness, and competence. To create a composite score referring to *psychological need fulfillment*, we subtracted the aggregated frustration score from the aggregated satisfaction score for each need, resulting in a relative index going from -4 to $+4$ with 0 as the mid-point between frustration (i.e. negative score) and satisfaction (i.e. positive score). Example items are “I felt that my decisions reflected what I really wanted” (i.e. autonomy), “I had the impression that people I spent time with disliked me” (i.e. relatedness), and “I felt confident that I could do things well” (i.e. competence). Internal consistency of the total score for psychological need satisfaction was acceptable ($\alpha_{\text{between}} = .92$; $\alpha_{\text{within}} = .93$; $\omega_{\text{between}} = .77$; $\omega_{\text{within}} = .76$).

Symptoms of anxiety and depression

Depressive symptoms were assessed with a 6-item version of the Center for Epidemiological Studies—Depression scale (CES-D; Van Hiel & Vansteenkiste, 2009; Radloff, 1977). Anxiety symptoms were assessed with a 4-item version of the State Trait Anxiety Inventory (STAI, Marteau & Bekker, 1992). Additionally, one item was added from the full version of the STAI to tap into anxiety in a more direct way (i.e. “I felt anxious”). Items were preceded by the item stem (i.e. “During the past week in the corona crisis ...”) and needed to be rated on a scale ranging from 1 (*seldom or never, less than 1 day*) to 4 (*mostly or all the time, 5 to 7 days*). Internal consistencies for depressive symptoms ($\alpha_{\text{between}} = .91$; $\alpha_{\text{within}} = .71$; $\omega_{\text{between}} = .92$; $\omega_{\text{within}} = .73$) and anxiety symptoms ($\alpha_{\text{between}} = .96$; $\alpha_{\text{within}} = .70$; $\omega_{\text{between}} = .95$; $\omega_{\text{within}} = .70$) were acceptable at the between-person level but rather moderate at the within-person level.

Plan of analysis

As part of the preliminary analyses, we first performed a linear model to check for the selectivity of the included participants. This was done to find out whether the number of participations, ranging between 1 and 13 times, was associated with participants' sociodemographic variables or their scores on the study variables.

Second, we examined the role of participants' sociodemographic characteristics in the study variables on the between-person level. This was done by running linear mixed regression models for each study variable with age, gender, marital status, education level and comorbidities as simultaneous predictors. By including all covariates in a single model, we gain insight in their unique role. This analysis was performed by using the “lme4” package in R (Bates et al., 2015). In linear mixed modeling, the dependency in the variance of the outcome is taken into account, as participants reported on the same variable multiple times across time. The model then combines fixed and random effects. The fixed effects are similar to the coefficients in a traditional linear regression model, while the random effects account for the nested structure of the data by modeling the variance at different levels. We modeled a random

intercept for each participant (i.e. how much do datapoints within each individual deviate from the overall model intercept) and a random slope for time (i.e. how much does the association between the predictor and the outcome vary between participants?; Baird & Maxwell, 2016; Heisig & Schaeffer, 2019). To justify the use of such a linear mixed regression model, we calculated the ICC (i.e. intra-class correlation), which represents the amount of variance situated at the level of between- and within-person differences. The higher the ICC, the stronger the evidence for the use of multilevel analyses (Musca et al., 2011).

To address Objective 1 in the main analyses, we built a series of multiple linear mixed regression models predicting concerns in a hierarchical way. In a first step, we included the sociodemographic background variables age, gender, education level, comorbidity and marital status, and the personal risk factors. *Need fulfillment* was added in the second step as a predictor, followed by its interaction with personal risks on both levels in Step 3 and added cross-level interactions in Step 4. In these models, variables on the between-person level were grand mean centered (i.e. subtracting the mean across all phases for each participant from the mean of the total sample), while variables on the within-person level were calculated by group mean centering (i.e. subtracting the individual score on each phase from the individual's overall mean). Also, we controlled for levels of concerns as reported on the previous wave, allowing us to examine whether need fulfillment on a given wave (i.e. wave x) related to changes in concerns relative to the previous wave (i.e. changes from wave $x-1$ to wave x).

The second objective was also examined with linear mixed regression models, in which we predicted the outcomes (i.e. depressive and anxiety symptoms) by both the background variables, experienced concerns, need fulfillment, and their interactions. Again, using the procedures with grand and group mean centering, predictors were added on both levels, allowing for a test of interactions within levels and between levels. Also here, the outcome variable as reported on the previous wave was included as a covariate. When an interaction was significant, it was visualized by presenting the predicted values for the high (+1 standard deviation) and low (−1 standard deviation) levels of both the predictor on the x -axis (i.e. concerns) and the moderator (i.e. need fulfillment), accompanied by the standardised simple slope coefficients. In addition, a gray zone was added in these figures representing the total range of values of the moderator, in which we colored those values of the moderator that result in no significant association between the predictor and the outcome in blue. This is done through the Johnson–Neyman technique, which allows for a better understanding of the interaction. All analyses and visualization were performed in Rstudio (R Core Team, 2022).

RESULTS

Preliminary analyses

Regarding the selectivity of the current sample, significant effects were found for age, gender comorbidities, and marital status, such that those being older, being female, having lower comorbidities, and being in a partner relationship completed more surveys (Table S2). Further, the more participants reported concerns, and depressive symptoms, the less often they participated in the surveys, while more anxiety symptoms resulted in more participations. It should be noted that only age and gender displayed non-negligible associations with the number of participants in terms of effect sizes (with the percentage of explained variance being higher than .01).

In terms of the study variables, the output of the models including the sociodemographic variables as predictors can be found in Table S3. Age and education level were uniquely associated with more need fulfillment and lower concerns and symptoms of depression and anxiety. Those with more comorbidities reported more personal risks, more concerns, lower need fulfillment and more symptoms of depression and anxiety. In terms of gender, female participants reported higher levels of concerns ($M_{\text{female}} = 3.28$ vs. $M_{\text{male}} = 3.13$) and higher symptoms of depression ($M_{\text{female}} = 1.62$ vs. $M_{\text{male}} = 1.42$) and anxiety ($M_{\text{female}} = 2.07$ vs. $M_{\text{male}} = 1.78$) compared with male participants. Those being single report more concerns ($M_{\text{single}} = 3.62$ vs. $M_{\text{partner}} = 3.52$), more symptoms of depression ($M_{\text{single}} = 1.82$ vs. $M_{\text{partner}} = 1.48$) and anxiety ($M_{\text{single}} = 2.26$ vs. $M_{\text{partner}} = 2.18$) and lower need fulfillment ($M_{\text{single}} = 1.17$ vs. $M_{\text{partner}} = 1.70$) compared with those with a partner. Given all sociodemographic variables yielded a unique association with all outcomes, they were all controlled for in the main analyses.

Table 1 represents the Pearson correlations between the personal risk factor and the study variables. Herein, the level of personal risks correlates positively with concerns and symptoms of depression and anxiety at the between-person level. At the within-person level, personal risks are associated with more concerns but not with symptoms of anxiety and depression. At both levels of analysis, associations with symptoms of anxiety and depression were negative for need fulfillment and positive for concerns. Table 1 also represents descriptive statistics and ICC values for the study variables. In each of the study variables, except personal risks, more than 50% of the variance was situated at the between-person level. Yet, in each of the variables, there was also substantial variance at the within-person level (>30%). The variable representing personal risks was an exception to this pattern, with most of the variance of this variable being situated at the within-person level and indicating that the degree to which people were exposed to risks varied strongly between the different phases of the crisis.

Primary analyses

Objective 1: the role of need fulfillment in concerns

Table 2 shows the results of the hierarchical mixed modeling. After controlling for the background variables, personal risks had a significant positive effect on concerns, albeit only at the between-person level. The second model provided evidence for the unique contribution of need fulfillment: both higher overall levels of need fulfillment and temporary increases in need fulfillment during a specific period were related to lower concerns, even when taking into account

TABLE 1 Descriptive statistics and Pearson correlations at the between-person level (under the diagonal) and within-person level (above the diagonal).

	M	SD	ICC	1.	2.	3.	4.	5.
1. Personal risks	0.18	0.51	.16		.03***	-.02	.02	.01
2. Concerns	3.26	0.83	.59	.29***		-.21***	.19***	.27***
3. Need fulfillment	1.58	1.31	.67	-.09***	-.28***		-.50***	-.43***
4. Depressive symptoms	1.53	0.60	.65	.16***	.39***	-.79***		.59***
5. Anxiety symptoms	1.95	0.77	.69	.17***	.54***	-.76***	.84***	

* $p < .05$, ** $p < .01$, and *** $p < .001$.

TABLE 2 Hierarchical linear mixed regression models in predicting concerns.

Fixed effects	Model 1				Model 2				Model 3				Model 4			
	β	F	p	η_p^2	β	F	p	η_p^2	β	F	p	η_p^2	β	F	p	η_p^2
Between-person																
Age	.03	2.55	.11	0.00	.09	12.19	<.001***	.01	.08	12.04	<.001***	.01	.08	12.01	<.001***	.01
Gender [female]	.26	32.45	<.001***	0.02	.21	17.02	<.001***	.01	.21	17.06	<.001***	.01	.21	16.93	<.001***	.01
Civil status [single]	.02	0.26	.61	0.00	.00	0.01	.94	.00	.00	0.00	.96	.00	.00	0.00	.96	.00
Education level	-.09	2.85	.06	0.00	-.06	0.53	.59	.00	-.06	0.56	.57	.00	-.06	0.55	.58	.00
Comorbidity	.04	7.28	.01***	0.00	.06	11.89	<.001***	.00	.06	11.50	<.001***	.00	.06	11.42	<.001***	.00
Personal risks (PR)	.23	88.42	<.001***	0.05	.21	60.86	<.001***	.04	.21	61.51	<.001***	.04	.21	60.96	<.001***	.04
Need frustration (NF)					-.16	41.88	<.001***	.03	-.15	42.03	<.001***	.03	-.15	42.53	<.001***	.03
PR:NF									.02	0.72	.40	.00	.02	0.60	.44	.00
Within-person																
Concerns (wave x-1)	-.04	15.50	<.001***	0.00	-.03	6.12	.01*	.00	-.03	6.07	.01*	.00	-.03	6.12	.01*	.00
PR	.01	0.44	.51	0.00	.00	0.20	.65	.00	.00	0.42	.52	.00	.00	0.48	.49	.00
NF					-.04	16.51	<.001***	.01	-.04	9.43	<.001***	.01	-.04	8.90	<.001***	.01
PR:NF									.02	2.11	.15	.00	.02	2.08	.15	.00
Cross-level																
PR (with):NF (btw)									.01	0.71	.40	.00	.01	0.71	.40	.00
PR (btw):NF (wth)									.00	0.02	.90	.00	.00	0.02	.90	.00
Random effects																
$\sigma_{\text{participants}}$ (intercept)		.64		.63						.64		.64				.64
$\sigma_{\text{participants}}$ (PR)		.01		.01						.02		.02				.02
$\sigma_{\text{participants}}$ (NF)				.14						.14		.14				.15
σ_{residual}		.48		.47						.47		.47				.47
R^2 (marginal/conditional)		.08/.67		.10/.68						.10/.68		.10/.68				.10/.68

Note: η_p^2 refers to the partial eta squared; PR is the Personal Risk factor; NF to Need Fulfillment; (btw) refers to the interindividual level, (wth) to the within-person level; σ refers to random effect. * $p < .05$, ** $p < .01$, and *** $p < .001$.

the personal risks to which people were exposed. Need-based experiences did not interact with the exposure to personal risks, as can be noticed in the third model. The final model allowed cross-level interactions between personal risks and need fulfillment, which were not found to be significant. Overall, there were robust main effects of need fulfillment on concerns, even when controlling for individuals' various types of risk exposure.^{1,2}

Objective 2: the buffering role of need fulfillment in the effects of concerns

Table 3 displays the results of two models predicting changes in depressive and anxiety symptoms. After controlling for the background variables and the outcome of the previous wave,

TABLE 3 Linear mixed regression models predicting depressive and anxiety symptoms.

	Depressive symptoms				Anxiety symptoms			
	β	<i>F</i>	<i>p</i>	η_p^2	β	<i>F</i>	<i>p</i>	η_p^2
Fixed effects								
Interindividual								
Age	-.01	0.33	.57	.00	-.09	61.50	<.001***	.06
Gender [female]	.05	4.84	.03	.00	.04	3.45	.06	.00
Civil status [single]	.16	49.08	<.001***	.03	.01	0.34	.56	.00
Education level	-.01	0.30	.74	.00	-.02	1.36	.26	.00
Comorbidity	.01	0.90	.34	.00	.01	1.42	.23	.00
Concerns	.11	82.71	<.001***	.08	.23	380.36	<.001***	.26
Need fulfillment (NF)	-.41	881.18	<.001***	.38	-.37	811.84	<.001***	.39
Concerns:NF	-.03	12.56	<.001***	.01	-.02	3.07	.08	.00
Within-person								
Concerns	.05	34.13	<.001***	.04	.08	96.86	<.001***	.12
NF	-.19	367.77	<.001***	.29	-.14	263.55	<.001***	.25
Concerns:NF	.00	0.01	.92	.00	.00	0.38	.54	.00
Outcome (wave x-1)	.29	629.77	<.001***	.12	.32	686.65	<.001***	.14
Cross-level								
Concerns (btw):NF (wth)	-.03	9.85	<.001***	.01	-.02	8.01	<.001***	.01
Concerns (wth):NF (btw)	-.00	3.67	.07	.01	.00	0.14	.71	.00
Random effects								
$\sigma_{\text{participants (intercept)}}$.19				.22	
$\sigma_{\text{participants (NF)}}$.16				.15	
$\sigma_{\text{participants (Concerns)}}$.11				.13	
σ_{residual}			.28				.37	
R^2 (marginal/conditional)			.61/.76				.65/.76	

Note: η_p^2 refers to the partial eta squared; (btw) refers to the interindividual level, (wth) to the within-person level; σ refers to random effect.

* $p < .05$. ** $p < .01$. *** $p < .001$.

there were significant main effects of both concerns and need fulfillment on both symptoms of anxiety and depression, with these effects showing up on both the between-person and the within-person level. Across all phases of the crisis, those being highly concerned showed higher levels of both anxiety and depressive symptoms, with people with higher need fulfillment reporting lower symptoms of anxiety and depression. Moreover, concerns and need fulfillment interacted in the prediction of depressive symptoms at the between-person level. As can be seen in Figure 1a, the association between concerns and depressive symptoms was less pronounced (yet still significant) among individuals reporting higher need fulfillment. Said differently, need fulfillment buffered to some extent the positive association between concerns and symptoms of depression.

At the within-person level, both a temporary increase in concerns and an increase in need fulfillment predicted changes in symptoms of anxiety and depression. During a period with elevated concerns, people reported more anxiety and depressive complaints compared with their usual levels. In contrast, they reported reduced anxiety and depression symptoms in case their psychological needs were met in a given period. Different from the between-person level, no interactions between concerns and psychological need fulfillment were found at the within-person level, meaning that the psychological costs of having more concerns in a particular period are not buffered when also having higher levels of need fulfillment within that period.

Yet temporary increases in need fulfillment played a role as a cross-level moderator. Specifically, an interaction was found between between-person differences in concerns and within-person differences in need fulfillment in the prediction of both symptoms of anxiety and depression. As shown in Figure 1b, especially highly concerned individuals benefited from a period of elevated need fulfillment. The positive association between individuals' overall levels of concerns and anxiety symptoms was less pronounced for those who experienced a temporary increase in need fulfillment compared with usual. Notably, the alternative cross-level interaction involving between-person differences in need fulfillment and within-person fluctuations in concerns was not significant.

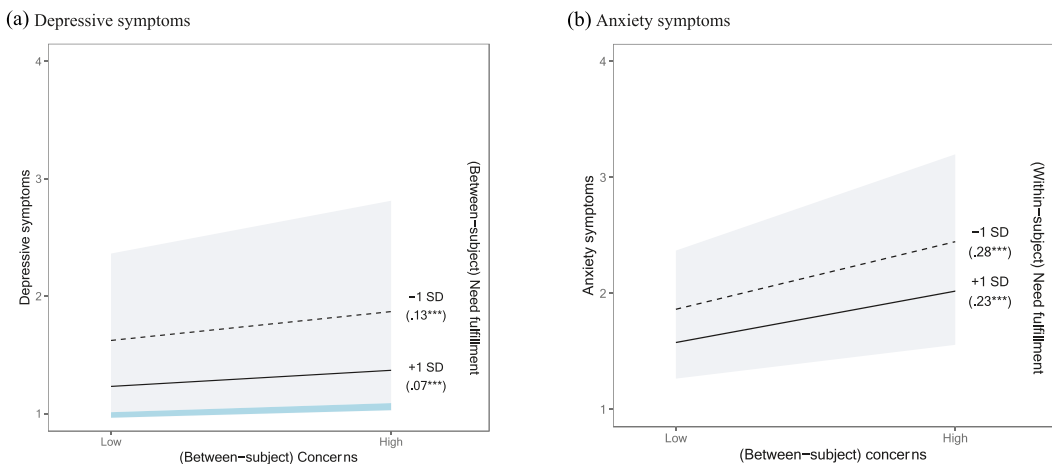


FIGURE 1 Interactions between concerns and need fulfillment. Note. * $p < .05$, ** $p < .05$, *** $p < .001$.

DISCUSSION

The crucial role of the basic psychological needs for autonomy, competence, and relatedness in people's well-being has been demonstrated abundantly. Yet the resilience-fostering role of need fulfillment in handling stressors and adversity has received far less attention. Need fulfillment not only serve to directly enhance well-being, it would also protect them in stressful situations through improved management of psychological distress (Vansteenkiste & Ryan, 2013). The present study considered two different routes through which need fulfillment may play such a resilient role.

First, we examined whether need fulfillment would result in a more benign appraisal and experience of distressing events. In the context of the COVID-19 crisis, we tested whether need fulfillment would be related to lower health-related concerns, even when considering a set of personal risks to which people were exposed. Our findings confirmed the hypothesized effect of need fulfillment on concerns at both the between- and within-person levels. Holding constant individuals' exposure to personal risks (e.g. being infected by the virus), people who reported more overall need fulfillment than others experienced lower concerns than others. Similarly, in periods when people experienced higher need fulfillment, they experienced a parallel decrease in concerns. These findings indicate that psychological need fulfillment goes together with lower concerns than can be expected on the basis of the risks to which people are exposed.

Second, we tested whether psychological need fulfillment would buffer the psychological costs that are related to experienced concerns. At both the between- and within-person levels, we found strong main effects of both need fulfillment and concerns, which were associated, respectively, negatively and positively with symptoms of depression and anxiety. Need fulfillment yielded a stronger effect than concerns, meaning that especially higher need fulfillment, compared with others or periodically, plays a robust role in reduced symptoms of depression and anxiety. The unique effects of need fulfillment, controlled for the effect of concerns, are already somewhat indicative of the resilient role of need fulfillment. Holding individuals' subjective concerns constant, people who reported more overall need fulfillment, or who went through a period of increased need fulfillment, are less prone to symptoms of anxiety and depression.

As more compelling evidence for this resilient role, need fulfillment also affected the strength of associations between concerns and symptoms of anxiety and depression (i.e. a moderation effect). In line with Vermote et al. (2022), the association between concerns and depressive symptoms at the between-person level was less pronounced among people experiencing higher overall need fulfillment. This buffering effect was not found for anxiety symptoms. Probably, the stronger unique association with concerns generates less variance to be explained by levels of need fulfillment. Similar evidence for a buffering role of need fulfillment was obtained through two cross-level interactions. Especially individuals who are most vulnerable to symptoms of anxiety and depression, that is, those reporting high concerns, were found to benefit the most from a periodic increase in need fulfillment. When these concerned individuals were in a period of elevated need fulfillment, they reported fewer symptoms of anxiety and depression. An opposite cross-level interaction between interindividual differences in need fulfillment and within-person associations between concerns and symptoms of anxiety and depression was not obtained. Also, there were no significant moderating effects of need fulfillment at the within-person level.

Overall, the evidence for the role of psychological need satisfaction in the appraisal of events was somewhat more consistent and robust than the evidence for the moderating role of need fulfillment in the effects of concerns on experienced distress. Apparently, need fulfillment primarily plays a role in the input side of the processes leading from stressful events to anxiety and depression symptoms. As soon as people interpret the situation as worrisome and concerning, there is relatively less room for need fulfillment to play a buffering role. The few interactions obtained do suggest that need fulfillment can to some extent take the edge off concerns. Yet it does not fully cancel out the affective costs associated with concerns. Perhaps need fulfillment is a somewhat distant source of resilience in this part of the process, with other psychological processes playing a more proximal intervening role. For instance, need fulfillment may provide people with the psychological energy needed to recruit effective emotion regulation and coping strategies that, in turn, allow them to better manage concerns. Future research would do well to consider the intervening role of these additional, specific sources of resilience, thereby testing the possibility of a mediated moderation effect of psychological need fulfillment via emotion regulation and coping (Roth et al., 2019).

Furthermore, future experimental studies could provide more direct evidence for the causal role of the needs, with manipulated need fulfillment causing a decrease in concerns when being exposed to personal risks. Currently, an aggregated score of personal risks was considered, which could be decomposed into its facets in vignette-based, experimental work. One would then examine whether need fulfillment would yield a similar resilience-fostering role for different types of personal risk. Given the present study was conducted in a single Western country, the question can be raised whether the findings would generalize to different cultures and populations. Although need satisfaction is said to serve as an universal nutrient for mental health, there might be cross-cultural variation in the specific coping and emotion regulation responses that are involved in resilience (Chen, Van Assche, et al., 2015).

Theoretical and practical implications

The present study has important theoretical and practical implications. First, the observation that neither individuals' personal risks nor their concerns canceled the beneficial effects of need fulfillment testifies to the very robust role of psychological need fulfillment in mental health. This observation runs counter to Maslow's (1955) pre-potency principle, according to which the growth-conducive role of needs situated higher in the hierarchy (e.g. love, self-esteem, and self-actualization) depends on the satisfaction of physiological (e.g. food, sleep, and water) and safety needs (e.g. security, health, and resources) situated lower in the hierarchy. Yet the basic needs for autonomy, competence, and relatedness played a significant role in the prediction of all outcomes (i.e. concerns, symptoms of anxiety and depression) at both levels of analysis (i.e. the between- and within-person level), *regardless* of interindividual or within-person differences in concerns or risk exposure. The current findings offer no evidence for such a hierarchical ordering, with the effects of need fulfillment even being substantially larger than the role of experienced concerns in people's well-being. Notably, need satisfaction may not only predict concerns, but a recursive association may also emerge, with higher concerns thus precluding individuals from getting their basic needs met, an issue that deserves greater attention in future research.

Second, the present study contributes to a better understanding of how psychological need fulfillment serves as a source of resilience. The approach taken in the current study yields more

detailed insights in the specific way how need satisfaction fosters resilience in comparison with studies that made use of generic and self-reported assessments of resilience, like the Connor-Davidson Resilience Scale (Connor & Davidson, 2003) or the Brief Resilience Scale (Smith et al., 2008). The current findings teased apart specific processes involved in resilience (Smith et al., 2008), including the more benign appraisal of potentially stressful life events and individuals' ability to 'bounce back' even when experiencing high levels of concern. People with higher need fulfillment display more plasticity to modify cognitive and behavioral processes to manage potentially stressful situations proactively and constructively (Den Hartigh & Hill, 2022).

Given that people's basic psychological needs serve a resilient role during times of threat and security, the needs for autonomy, competence, and relatedness can be considered important targets for communication at the group level and intervention at the individual level. For instance, the governmental communication style during the pandemic was at times supportive of and at other times forestalling the satisfaction of basic needs, with ensuing consequences for individuals' resilience. A number of vignette studies indeed showed that people's experienced autonomy and a sense of choice depends on the governments' perceived communication style (Martela et al., 2021). In addition to being influenced by the social context, people can also proactively seek need fulfillment by themselves. Through need crafting, people indeed proactively seek and engage in more need-satisfying activities (Laporte et al., 2021). Interestingly, several recent intervention studies showed that people's capacity for need crafting can be improved through interventions. For instance, Behzadnia and FatahModares (2020) showed that students who followed an intervention on how to support their own needs reported higher need fulfillment, more vitality, and less test anxiety across time. Similarly, Laporte et al. (2022) showed that an intervention targeting need crafting was effective in increasing adults' need crafting during the COVID-19 crisis, at least when people were sufficiently engaged during the intervention. In turn, need crafting was related to more need fulfillment and better mental health. Given the promising findings of these interventions, need crafting may represent one important pathway through which individuals' resilience can be strengthened in both prevention programs and individual counseling.

Limitations

The current study has a number of limitations that need to be taken into account when interpreting these results. First, the sample consisted of participants who were invited to complete the questionnaire via online channels. This procedure resulted in a selection of participants who had access to a computer and internet. Moreover, within this group, there was a further selection of people who filled out the survey several times, over a long period during the crisis. Because we selected participants who completed the questionnaire at least nine times, the current sample was quite selective because it consisted of people with sufficient energy, interest, and persistence to continue their participation in the study. Most likely, these participants were better adjusted than people in the overall population. As such, we may have missed people confronted with more severe and enduring risk factors and people displaying clinically elevated levels of psychopathology. Although we focused mainly on structural associations, it is important to consider the selected nature of the sample, which limits the generalization of our findings.

Second, the sample consisted mainly of older and highly educated women with a partner. Given the role of these sociodemographic characteristics in the study variables and in the

number of participations in the repeated assessments, the descriptive statistics obtained in the current study should be interpreted with caution because they may not generalize to the (Belgian) population. In addition, we also did not account for changes in the sociodemographics, as people also became older or might have shifted in their education level. As another consideration, the current sample is also large such that effects are quickly detected as significant. We dealt with this issue by including partial eta squares, which provide an estimation of the effect size of the observed effects (Sullivan & Feinn, 2012).

Third, as all constructs were measured via self-reports, some of the observed associations may be artificially inflated because of shared method variance. Future research would do well to adopt a multi-method and multi-informant approach, thereby for instance including medical proofs of COVID-19 infections, partner reports of mental health, or physiological markers of distress.

CONCLUSION

Fulfillment of the basic psychological needs for autonomy, competence, and relatedness has direct positive consequences for individuals' well-being. In addition to this direct advantage of need fulfillment for individuals' psychological health, the current study showed that psychological need fulfillment also acts as a source of resilience in the face of adversity. Even when taking into account the levels of personal risks to which people were exposed, need fulfillment was related to lower concerns. Additionally, there was some initial evidence that psychological need fulfillment could buffer the affective costs typically associated with concerns. For instance, people being highly concerned overall reported lower depression and anxiety symptoms when they experienced a period of higher need fulfillment. These findings support the theoretical notion that need fulfillment enhances individuals' ability to cope with negative life events. From an applied perspective, this insight confirms the importance of developing and disseminating effective interventions and programs that support individuals in their efforts to fulfill their basic psychological needs, thereby promoting resilience and well-being in the face of adversity.

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CONFLICT OF INTEREST STATEMENT

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

DATA AVAILABILITY STATEMENT

The R scripts to carry out the analyses are publicly available on Open Science Framework: https://osf.io/e8taf/?view_only=2e78877c13ac43d6882611a5dda0e043. Datasets are hosted in Zenodo (a public repository) and are available upon request and for replication purposes only (after contacting responsible researcher).

ETHICS STATEMENT

The project was approved by the ethical committee of Ghent University, Belgium (No. 2020/37). Informed consent was obtained from all the participants. All methods/protocols were performed in accordance with the relevant guidelines and regulations.

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ENDNOTES

¹ We also checked whether the results of these models holds when only taking into account one of the risk factors. In doing this, we checked this for *being hospitalized* and *experiencing symptoms*, for which these models showed similar effects of need fulfillment on concerns.

² We also checked for the current set of analyses including only assessments of need satisfaction and need frustration, revealing similar effects as we found in the current research using the composite score for need fulfillment (see Tables S4–S6 and Figure S1).

REFERENCES

- Baird, R., & Maxwell, S. E. (2016). Performance of time-varying predictors in multilevel models under an assumption of fixed or random effects. *Psychological Methods*, 21(2), 175–188. <https://doi.org/10.1037/met0000070>
- Bates, D., Mächler, M., Bolker, B., & Walker, S. (2015). Fitting linear mixed-effects models using lme4. *Journal of Statistical Software*, 67(1), 1–48. <https://doi.org/10.18637/jss.v067.i01>
- Behzadnia, B., & FatahModares, S. (2020). Basic psychological need-satisfying activities during the COVID-19 outbreak. *Applied Psychology. Health and Well-Being*, 12(4), 1115–1139. <https://doi.org/10.1111/aphw.12228>
- Benita, M., Benish-Weisman, M., Matos, L., & Torres, C. (2020). Integrative and suppressive emotion regulation differentially predict well-being through basic need satisfaction and frustration: A test of three countries. *Motivation and Emotion*, 44, 67–81. <https://doi.org/10.1007/s11031-019-09781-x>
- Brenning, K., Soenens, B., Vansteenkiste, M., De Clercq, B., & Antrop, I. (2022). Emotion regulation as a transdiagnostic risk factor for (non) clinical adolescents' internalizing and externalizing psychopathology: Investigating the intervening role of psychological need experiences. *Child Psychiatry & Human Development*, 53, 124–136. <https://doi.org/10.1007/s10578-020-01107-0>
- Brühlhart, M., Klotzbücher, V., Lalive, R., & Reich, S. K. (2021). Mental health concerns during the COVID-19 pandemic as revealed by helpline calls. *Nature*, 600(7887), 121–126. <https://doi.org/10.1038/s41586-021-04099-6>
- Brunelle, E., & Fortin, J. A. (2021). Distance makes the heart grow fonder: An examination of teleworkers' and office workers' job satisfaction through the lens of self-determination theory. *SAGE Open*, 11(1). <https://doi.org/10.1177/2158244020985516>

- Bryan, C., O'Shea, D., & MacIntyre, T. (2019). Stressing the relevance of resilience: A systematic review of resilience across the domains of sport and work. *International Review of Sport and Exercise Psychology*, 12(1), 70–111. <https://doi.org/10.1080/1750984X.2017.1381140>
- Campbell, R., Soenens, B., Beyers, W., & Vansteenkiste, M. (2018). University students' sleep during an exam period: The role of basic psychological needs and stress. *Motivation and Emotion*, 42, 671–681. <https://doi.org/10.1007/s11031-018-9699-x>
- Chen, B., van Assche, J., Vansteenkiste, M., Soenens, B., & Beyers, W. (2015). Does psychological need satisfaction matter when financial or environmental safety are at risk? *Journal of Happiness Studies*, 16, 745–766. <https://doi.org/10.1007/s10902-014-9532-5>
- Chen, B., Vansteenkiste, M., Beyers, W., Boone, L., Deci, E. L., Van der Kaap-Deeder, J., Duriez, B., Len, W., Matos, L., Mouratidis, A., Ryan, R. M., Sheldon, K. M., Soenens, B., Van Petegem, S., & Verstuyf, J. (2015). Basic psychological need satisfaction, need frustration, and need strength across four cultures. *Motivation and Emotion*, 39, 216–236. <https://doi.org/10.1007/s11031-014-9450-1>
- Connor, K. M., & Davidson, J. R. (2003). Development of a new resilience scale: The Connor-Davidson resilience scale (CD-RISC). *Depression and Anxiety*, 18(2), 76–82. <https://doi.org/10.1002/da.10113>
- Datu, J. A. D., & Fincham, F. D. (2022). The relational and mental health payoffs of staying gritty during the COVID-19 pandemic: A cross-cultural study in the Philippines and the United States. *Journal of Social and Personal Relationships*, 39(3), 459–480. <https://doi.org/10.1177/02654075211029380>
- DeHaan, C. R., Hirai, T., & Ryan, R. M. (2016). Nussbaum's capabilities and self-determination theory's basic psychological needs: Relating some fundamentals of human wellness. *Journal of Happiness Studies*, 17, 2037–2049. <https://doi.org/10.1007/s10902-015-9684-y>
- Den Hartigh, R. J., & Hill, Y. (2022). Conceptualizing and measuring psychological resilience: What can we learn from physics? *New Ideas in Psychology*, 66, 100934. <https://doi.org/10.1016/j.newideapsych.2022.100934>
- Desrumaux, P., Dose, E., Condetto, S., & Bouterfas, N. (2023). Teachers' adjustment to work: Effects of organizational justice and teacher resilience via psychological need satisfaction. *Journal of Workplace Behavioral Health*, 38, 1–23. <https://doi.org/10.1080/15555240.2022.2162535>
- Dunkley, D. M., Mandel, T., & Ma, D. (2014). Perfectionism, neuroticism, and daily stress reactivity and coping effectiveness 6 months and 3 years later. *Journal of Counseling Psychology*, 61(4), 616–633. <https://doi.org/10.1037/cou0000036>
- Dursun, A., Kaplan, Y., Altunbaş, T., & Bahtiyar, M. (2022). The mediating effect of experiential avoidance on the relationship between psychological resilience and psychological needs in the COVID-19 pandemic. *Current Psychology*, 1–11. <https://doi.org/10.1007/s12144-022-03085-z>
- Galli, N., & Gonzalez, S. P. (2015). Psychological resilience in sport: A review of the literature and implications for research and practice. *International Journal of Sport and Exercise Psychology*, 13(3), 243–257.
- Heisig, J. P., & Schaeffer, M. (2019). Why you should always include a random slope for the lower-level variable involved in a cross-level interaction. *European Sociological Review*, 35(2), 258–279. <https://doi.org/10.1093/esr/jcy053>
- Horesh, D., Kapel Lev-Ari, R., & Hasson-Ohayon, I. (2020). Risk factors for psychological distress during the COVID-19 pandemic in Israel: Loneliness, age, gender, and health status play an important role. *British Journal of Health Psychology*, 25(4), 925–933. <https://doi.org/10.1111/bjhp.12455>
- Knežević, J., & Krstić, T. (2019). The role of basic psychological needs in the perception of job insecurity. *Archives of Industrial Hygiene and Toxicology*, 70(1), 54–59. <https://doi.org/10.2478/aiht-2019-70-3156>
- Laporte, N., Soenens, B., Flamant, N., Vansteenkiste, M., Mabbe, E., & Brenning, K. (2021). The role of daily need crafting in daily fluctuations in adolescents' need-based and affective experiences. *Motivation and Emotion*, 1–13.
- Laporte, N., van den Bogaard, D., Soenens, B., & Vansteenkiste, M. (2022). Testing an online program to foster need crafting during the COVID-19 pandemic. *Current Psychology*, 1–18. <https://doi.org/10.1007/s12144-022-03012-2>
- Lazarus, R. S., & Folkman, S. (1984). *Stress, appraisal, and coping*. Springer.
- Leng, M., Wei, L., Shi, X., Cao, G., Wei, Y., Xu, H., Zhang, X., Zhang, W., Xing, S., & Wei, H. (2021). Mental distress and influencing factors in nurses caring for patients with COVID-19. *Nursing in Critical Care*, 26(2), 94–101. <https://doi.org/10.1111/nicc.12528>

- Lera, M. J., & Abualkibash, S. (2022). Basic psychological needs satisfaction: A way to enhance resilience in traumatic situations. *International Journal of Environmental Research and Public Health*, *19*(11), 6649. <https://doi.org/10.3390/ijerph19116649>
- Levstek, M., Barnby, R. M., Pocock, K. L., & Banerjee, R. (2021). "It all makes us feel together": Young People's experiences of virtual group music-making during the COVID-19 pandemic. *Frontiers in Psychology*, *12*, 703892. <https://doi.org/10.3389/fpsyg.2021.703892>
- Magbe, E., Soenens, B., Vansteenkiste, M., van der Kaap-Deeder, J., & Mouratidis, A. (2018). Day-to-day variation in autonomy-supportive and psychologically controlling parenting: The role of parents' daily experiences of need satisfaction and need frustration. *Parenting*, *18*(2), 86–109. <https://doi.org/10.1080/15259192.2018.1444131>
- Marteanu, T. M., & Bekker, H. (1992). The development of a six-item short-form of the state scale of the Spielberger state—Trait anxiety inventory (STAI). *British Journal of Clinical Psychology*, *31*(3), 301–306. <https://doi.org/10.1111/j.2044-8260.1992.tb00997.x>
- Martela, F., Hankonen, N., Ryan, R. M., & Vansteenkiste, M. (2021). Motivating voluntary compliance to behavioural restrictions: Self-determination theory–based checklist of principles for COVID-19 and other emergency communications. *European Review of Social Psychology*, *32*(2), 305–347. <https://doi.org/10.1080/10463283.2020.1857082>
- Martela, F., & Sheldon, K. M. (2019). Clarifying the concept of well-being: Psychological need satisfaction as the common core connecting eudaimonic and subjective well-being. *Review of General Psychology*, *23*(4), 458–474. <https://doi.org/10.1177/1089268019880886>
- Maslow, A. H. (1955). Deficiency motivation and growth motivation. In M. R. Jones (Ed.), *Nebraska symposium on motivation*. University of Nebraska Press.
- Müller, F. H., Thomas, A. E., Carmignola, M., Dittrich, A. K., Eckes, A., Großmann, N., Martinek, D., Wilde, M., & Bieg, S. (2021). University students' basic psychological needs, motivation, and vitality before and during COVID-19: A self-determination theory approach. *Frontiers in Psychology*, *12*, 775804. <https://doi.org/10.3389/fpsyg.2021.775804>
- Musca, S. C., Kamiejski, R., Nugier, A., Méot, A., Er-Rafiy, A., & Brauer, M. (2011). Data with hierarchical structure: Impact of intraclass correlation and sample size on type-I error. *Frontiers in Psychology*, *2*, 74. <https://doi.org/10.3389/fpsyg.2011.00074>
- Neufeld, A., Mossière, A., & Malin, G. (2020). Basic psychological needs, more than mindfulness and resilience, relate to medical student stress: A case for shifting the focus of wellness curricula. *Medical Teacher*, *42*(12), 1401–1412. <https://doi.org/10.1080/0142159X.2020.1813876>
- Patrick, H., Knee, C. R., Canevello, A., & Lonsbary, C. (2007). The role of need fulfillment in relationship functioning and well-being: A self-determination theory perspective. *Journal of Personality and Social Psychology*, *92*(3), 434–457. <https://doi.org/10.1037/0022-3514.92.3.434>
- Pelikan, E. R., Lüftenegger, M., Holzer, J., Korlat, S., Spiel, C., & Schober, B. (2021). Learning during COVID-19: The role of self-regulated learning, motivation, and procrastination for perceived competence. *Zeitschrift für Erziehungswissenschaft*, *24*(2), 393–418. <https://doi.org/10.1007/s11618-021-01002-x>
- Qiu, J., Shen, B., Zhao, M., Wang, Z., Xie, B., & Xu, Y. (2020). A nationwide survey of psychological distress among Chinese people in the COVID-19 epidemic: Implications and policy recommendations. *General Psychiatry*, *33*(2), e100213. <https://doi.org/10.1136/gpsych-2020-100213>
- R Core Team. (2022). R: A language and environment for statistical computing. R Foundation for Statistical Computing, Vienna, Austria. <https://www.R-project.org/>
- Radloff, L. S. (1977). The CES-D scale: A self-report depression scale for research in the general population. *Applied Psychological Measurement*, *1*(3), 385–401. <https://doi.org/10.1177/014662167700100306>
- Reis, H. T., Sheldon, K. M., Gable, S. L., Roscoe, R., & Ryan, R. M. (2000). Daily well-being: The role of autonomy, competence, and relatedness. *Personality and Social Psychology Bulletin*, *26*, 419–435. <https://doi.org/10.1177/0146167200266002>
- Roth, G., Vansteenkiste, M., & Ryan, R. M. (2019). Integrative emotion regulation: Process and development from a self-determination theory perspective. *Development and Psychopathology*, *31*(3), 945–956.
- Ryan, R. M., & Deci, E. L. (2017). *Self-determination theory. Basic psychological needs in motivation, development, and wellness*.

- Ryan, R. M., Duineveld, J. J., Di Domenico, S. I., Ryan, W. S., Steward, B. A., & Bradshaw, E. L. (2022). We know this much is (meta-analytically) true: A meta-review of meta-analytic findings evaluating self-determination theory. *Psychological Bulletin*, *148*(11–12), 813–842. <https://doi.org/10.1037/bul0000385>
- Ryan, R. M., & Vansteenkiste, M. (2023). Self-determination theory: Metatheory, methods, and meaning. In *The Oxford handbook of self-determination theory* (p. 3). Oxford University Press. <https://doi.org/10.1093/oxfordhb/9780197600047.013.2>
- Šakan, D., Žuljević, D., & Rokvić, N. (2020). The role of basic psychological needs in well-being during the COVID-19 outbreak: A self-determination theory perspective. *Frontiers in Public Health*, *8*, 583181. <https://doi.org/10.3389/fpubh.2020.583181>
- Schrooyen, C., Soenens, B., Waterschoot, J., Vermote, B., Morbée, S., Beyers, W., Brenning, K., Dieleman, L., Van der Kaap-Deeder, J., & Vansteenkiste, M. (2021). Parental identity as a resource for parental adaptation during the COVID-19 lockdown. *Journal of Family Psychology*, *35*(8), 1053–1064. <https://doi.org/10.1037/fam0000895>
- Skinner, E. A., & Edge, K. (2002). Self-determination, coping, and development. In E. L. Deci & R. M. Ryan (Eds.), *Handbook of self-determination research* (pp. 297–337). University of Rochester Press.
- Smith, B. W., Dalen, J., Wiggins, K., Tooley, E., Christopher, P., & Bernard, J. (2008). The brief resilience scale: Assessing the ability to bounce back. *International Journal of Behavioral Medicine*, *15*, 194–200. <https://doi.org/10.1080/10705500802222972>
- Sullivan, G. M., & Feinn, R. (2012). Using effect size—Or why the P value is not enough. *Journal of Graduate Medical Education*, *4*(3), 279–282. <https://doi.org/10.4300/JGME-D-12-00156.1>
- Tang, M., Wang, D., & Guerrien, A. (2020). A systematic review and meta-analysis on basic psychological need satisfaction, motivation, and well-being in later life: Contributions of self-determination theory. *PsyCh Journal*, *9*(1), 5–33. <https://doi.org/10.1002/pchj.293>
- Tian, L., Chen, H., & Huebner, E. S. (2014). The longitudinal relationships between basic psychological needs satisfaction at school and school-related subjective well-being in adolescents. *Social Indicators Research*, *119*, 353–372. <https://doi.org/10.1007/s11205-013-0495-4>
- Troy, A. S., Willroth, E. C., Shallcross, A. J., Giuliani, N. R., & Mauss, I. B. (2023). Psychological resilience: An affect-regulation framework. *Annual Review of Psychology*, *74*, 547–576. <https://doi.org/10.1146/annurev-psych-020122-041854>
- Van Hiel, A., & Vansteenkiste, M. (2009). Ambitions fulfilled? The effects of intrinsic and extrinsic goal attainment on older adults' ego-integrity and death attitudes. *The International Journal of Aging and Human Development*, *68*(1), 27–51. <https://doi.org/10.2190/AG.68.1.b>
- Vansteenkiste, M., & Ryan, R. M. (2013). On psychological growth and vulnerability: Basic psychological need satisfaction and need frustration as a unifying principle. *Journal of Psychotherapy Integration*, *23*(3), 263–280. <https://doi.org/10.1037/a0032359>
- Vansteenkiste, M., Soenens, B., & Ryan, R. M. (2023). *Basic psychological needs theory: A conceptual and empirical review of key criteria* (pp. 84–123). The Oxford handbook of self-determination theory. <https://doi.org/10.1093/oxfordhb/9780197600047.013.5>
- Vella, S. L. C., & Pai, N. B. (2019). A theoretical review of psychological resilience: Defining resilience and resilience research over the decades. *Archives of Medicine and Health Sciences*, *7*(2), 233. https://doi.org/10.4103/amhs.amhs_119_19
- Vermote, B., Soenens, B., Vansteenkiste, M., Coenye, J., Verschueren, K., & Beyers, W. (2023). The how and the why of study choice processes in higher education: The role of parental involvement and the experience of having an authentic inner compass. *Journal of Adolescence*. <https://doi.org/10.1002/jad.12246>
- Vermote, B., Waterschoot, J., Morbée, S., Van der Kaap-Deeder, J., Schrooyen, C., Soenens, B., Ryan, R., & Vansteenkiste, M. (2022). Do psychological needs play a role in times of uncertainty? Associations with well-being during the COVID-19 crisis. *Journal of Happiness Studies*, *23*(1), 257–283. <https://doi.org/10.1007/s10902-021-00398-x>
- Verstuyf, J., Vansteenkiste, M., Soenens, B., Boone, L., & Mouratidis, A. (2013). Daily ups and downs in women's binge eating symptoms: The role of basic psychological needs, general self-control, and emotional eating. *Journal of Social and Clinical Psychology*, *32*(3), 335–361. <https://doi.org/10.1521/jscp.2013.32.3.335>

- Weinstein, N., Legate, N., & Przybylski, A. K. (2013). Beauty is in the eye of the psychologically fulfilled: How need satisfying experiences shape aesthetic perceptions of spaces. *Motivation and Emotion, 37*, 245–260. <https://doi.org/10.1007/s11031-012-9312-7>
- Weinstein, N., & Ryan, R. M. (2011). A self-determination theory approach to understanding stress incursion and responses. *Stress and Health, 27*(1), 4–17. <https://doi.org/10.1002/smi.1368>
- Yu, S., Levesque-Bristol, C., & Maeda, Y. (2018). General need for autonomy and subjective well-being: A meta-analysis of studies in the US and East Asia. *Journal of Happiness Studies, 19*, 1863–1882. <https://doi.org/10.1007/s10902-017-9898-2>

SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

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