



Testing an Online Program to Foster Need Crafting During the COVID-19 Pandemic

Nele Laporte¹ · Daphne van den Bogaard¹ · Katrijn Brenning¹ · Bart Soenens¹ · Maarten Vansteenkiste¹

Accepted: 10 March 2022 / Published online: 28 March 2022

© The Author(s), under exclusive licence to Springer Science+Business Media, LLC, part of Springer Nature 2022, corrected publication 2022

Abstract

The COVID-19 pandemic represents a threat not only to individuals' physical health but also to their mental health. Self-Determination Theory assumes that the satisfaction of basic psychological needs for autonomy, relatedness and competence promotes psychological well-being during destabilizing times. Yet, the pandemic seriously hampered individuals' opportunities to satisfy their needs. The current study provides a preliminary test of the effectiveness of a 7-session online program, LifeCraft, that promotes individuals' proactive attempts to uplift their need-based experiences (i.e., need crafting). Next to the effects on individuals' need crafting skills, we examined program-effects on adults' need-based experiences and mental health and we explored the role of participants' program engagement. An experimental study among 725 Belgian adults [$M_{\text{age}} = 51.67$ ($\text{range} = 26 - 85$); 68.55% female] was conducted, with an experimental condition of 252 and a control condition of 473 participants. At the level of the entire sample, there was limited evidence for the effectiveness of the program. There were only small immediate program-effects on need crafting and well-being. After taking into account the role of program engagement, findings showed that the program was more beneficial for participants who actively participated, with these participants reporting immediate and stable increases in need crafting, need satisfaction and well-being and decreases in need frustration. Further, changes in need crafting fully mediated changes in need-based experiences and well-being. To conclude, the findings provide initial evidence for the effectiveness of LifeCraft during the COVID-19 pandemic, with active participation being a prerequisite for the program to be effective.

Keywords COVID-19 · Self-Determination Theory · Need Crafting · E-Health · Psychological Needs · Adults

Introduction

The COVID-19 pandemic has become one of the largest global health challenges, with more than 260 million cases confirmed across the world in Winter 2021 (WHO, 2021). The virus represents a threat to both individuals' physical and mental health as the imposed sanitary measures (e.g., keeping physical distance, limiting social contacts) involve a strong rupture with individuals' daily routines (e.g., Boden et al., 2021; Brooks et al., 2020). The psychological impact of the COVID-19 pandemic has been demonstrated in studies documenting increases in psychological problems (e.g., anxiety, depression, suicidality, substance use) and decreases in well-being (e.g., life satisfaction, vitality) (Alzueta et al.,

2021; Blasco-Belled et al., 2020; Bueno-Notivol et al., 2021; Czeisler et al., 2020; Nguyen & Le, 2021). The pandemic affected the mental health of individuals across different age groups (e.g., Cao et al., 2020; van der Kaap-Deeder et al., 2021), cultures (e.g., Alzueta et al., 2021), and among both individuals with pre-existing mental health problems (Neelam et al., 2020) and individuals without a history of mental health issues (e.g. Khan et al., 2020; Pan et al., 2021).

To understand the impact of the COVID-19 pandemic on individuals' mental health, Self-Determination Theory (SDT, Ryan & Deci, 2017) highlights the importance of individuals' basic psychological needs for autonomy, relatedness, and competence. These three basic psychological needs are considered as universal ingredients of well-being and key resources for resilience in the face of stress (Vansteenkiste et al., 2020). Yet, due to the COVID-19 pandemic and the introduced safety measures, individuals' opportunities to satisfy their basic needs were seriously compromised

✉ Nele Laporte
NeleLeen.Laporte@Ugent.be

¹ Ghent University, Henri Dunantlaan 2, B-9000 Ghent, Belgium

(Šakan et al., 2020; van der Kaap-Deeder et al., 2021; Vermote et al., 2021).

Accordingly, an important question is how we can strengthen individuals' capacity to seek for opportunities to get their own psychological needs met in times of stress and insecurity, such as the COVID-19 pandemic. In this study, we sought to examine the effectiveness of an online program, LifeCraft, that aims to train individuals' capacity to proactively uplift their own need-based experiences (i.e., need crafting). Specifically, we examined effects of this program on individuals' need crafting skills, need-based experiences, and mental health. To better understand who benefits the most from this program, we also considered the moderating role of individuals' program engagement.

Basic Psychological Needs as a Source of Resilience

SDT (Deci & Ryan, 2000; Ryan & Deci, 2017), one of the most prominent and intensively studied theories in research on mental health, posits the basic psychological needs for autonomy, relatedness, and competence as essential and universal nutrients for well-being and psychosocial adjustment (Vansteenkiste et al., 2020). First, the need for autonomy denotes the extent to which individuals experience a sense of volition and psychological freedom in their actions, thoughts, and feelings. The need for relatedness refers to the experience of reciprocal care and closeness to important others. Finally, the need for competence entails the experience of personal efficacy and mastery.

A large number of both cross-sectional and longitudinal studies across different life domains, age groups, and cultures has shown convincingly that the satisfaction of the three basic psychological needs is growth-conducive, whereas the frustration of these needs hampers individuals' psychosocial functioning and increases risk for psychopathology (for an overview, see Ryan & Deci, 2017; Vansteenkiste et al., 2020). Importantly, basic psychological needs are not just 'luxury' products in times of prosperity. They equally play a nurturing and protective role during insecure times and in difficult contexts. For instance, need satisfaction was found to contribute to higher well-being even among individuals encountering severe financial difficulties (Tay & Diener, 2011) or living in dangerous neighbourhoods (Chen et al., 2015).

The COVID-19 pandemic seriously hampered individuals' opportunities to get their basic needs met (Šakan et al., 2020; Vermote et al., 2021). Due to the measures to prevent spreading of COVID-19 virus (e.g., Brooks et al., 2020), individuals felt restricted in their choices and were prevented from engaging in activities congruent with their personal interests and beliefs, thereby experiencing less autonomy than usual. Further, due to the physical distance measures and the limiting of social contacts, individuals were unable

to meet close others and to have physically intimate interactions with them, resulting in a loss of relatedness and even in isolation and loneliness. During the pandemic, people may also have had fewer opportunities to experience competence, with some people becoming (temporarily) unemployed and with diverse leisure activities being cancelled (e.g., Kawohl & North, 2020; Witteveen & Velthorst, 2020). Although the COVID-19 crisis posed several challenges to individuals' need satisfaction, a recent study among Belgian adults showed that psychological need satisfaction still mattered during the pandemic (Vermote et al., 2021). Satisfaction of the psychological needs was found to predict higher well-being and lower psychological distress, even when controlling for the insecurity experienced by people during the COVID-19 crisis.

Need Crafting and Mental Health

The observation that psychological need satisfaction contributes to better mental health during periods of crisis raises the question whether individuals can be supported in proactively uplifting their own need-based experiences. From the perspective of SDT, individuals' need-based experiences do not depend solely on contextual influences (such as the COVID-19 pandemic), but can also be influenced by individuals themselves (Ryan et al., 2019; Vansteenkiste et al., 2020). Recent research has begun to show that individuals can proactively uplift their need-based experiences through the process of *need crafting* (Laporte et al., 2021a, b). Specifically, individuals high on need crafting are aware of the activities, persons, and contexts that are need-conducive for them. Equipped with this self-knowledge, they seek and create opportunities to experience need satisfaction.

A set of initial studies among adolescents provided evidence that need crafting relates positively to individuals' need-based experiences and psychological well-being (Laporte et al., 2021a, b). A longitudinal study by Laporte et al., (2021a) showed that fluctuations in adolescents' need crafting went hand in hand with corresponding fluctuations in need-based experiences and subsequent mental health. These findings held even after taking into account the positive contribution of parental need support. Laporte et al., (2021b) showed similar associations at the level of daily variation in individuals' functioning.

Recent research also began to examine whether individuals' capacity for need crafting can be supported through experimental instructions or interventions. The few available experimental studies provided initial evidence for the malleability of need crafting in stressful times (Behzadnia & FatahModares, 2020; Weinstein et al., 2016). In a study by Weinstein et al., (2016), Syrian refugees were encouraged to engage in daily need-satisfying activities by selecting a need satisfying activity every day, using a list with suggested

activities that they could discuss with the staff during a daily personal meeting. This intervention led refugees to experience lower need frustration and less symptoms of stress and depression at the end of the week. During the COVID-19 pandemic, Behzadnia & FatahModares, (2020) instructed university students through text-messages to engage in need satisfying activities during ten days, thereby also providing daily advice on how to do the activity (e.g., do the activity with a family member). These instructions resulted in higher need satisfaction and vitality and lower need frustration and stress directly after the experimental period. In contrast to these promising findings, a group-based intervention program with adolescents (Laporte et al., 2022) demonstrated limited effects on changes in participants' need crafting, need-based experiences, and well-being. The more limited effectiveness of this intervention compared to the Weinstein et al. study (2016) and the study of Behzadnia & FatahModares, (2020) could be due to the format of the program's age group (i.e., adolescents instead of adults), the level of directness and guidance (i.e., more structured vs. open ended), the context (i.e., a safe versus a stressful environment), or any combination of these factors.

Building on the few experimental studies available, the current study provides a preliminary test of a program targeting adults' need crafting capacities, LifeCraft, that aims to uplift adults' need-based experiences and mental health during the COVID-19 pandemic. The current study aimed to extend previous research in three ways. First, as the procedures used in the available experiments are rather time-intensive (e.g., daily personal meetings, daily text-messages, group meetings) and as the COVID-19 pandemic affects the mental health of a wide range of individuals (e.g., Khan et al., 2020), the current program was fully automated in an online format (e.g., automatic reminders, response-driven exercises) to increase its scalability.

Second, as previous studies (Behzadnia & FatahModares, 2020; Weinstein et al., 2016) generally examined immediate effects directly after the experimental period without addressing more lasting changes in participants' need-based functioning and mental health, the current study aimed to investigate whether it is possible to strengthen individuals' need-based experiences and mental health in a more sustainable way, over a period of a month. The results of an experiment by Sheldon et al., (2010)—in which participants were instructed to engage in need-satisfying goals over a period of six months—provided some support that lasting increases in participants' mental health require a lasting shift in participants' need-conducive behavior. To promote such more durable changes in individuals' need-conducive behavior, a more profound approach was deemed necessary than 'simply' instructing people to engage in need-satisfying activities. It can be assumed that it is necessary to address not only the action taking component of need crafting, but also the

awareness component of need crafting. Accordingly, the current program was developed in an attempt to help people in developing and cultivating a need-oriented mindset, thereby increasing people's knowledge and awareness of their basic psychological needs (i.e., the awareness component of need crafting) as well as encouraging them to take action to get their needs met (i.e., the action taking component of need crafting). Specifically, the program extends previous programs by adding a psycho-educational section and a series of reflection exercises to allow people to get better in touch with their need-based functioning (i.e., awareness). Also, to facilitate implementation of the taught skills in participants' daily life (i.e., action taking), we included, similar to extant experiments (Behzadnia & FatahModares, 2020; Weinstein et al., 2016), a series of six well-structured and rather directive challenges with corresponding homework practices.

Third, the current study also examined whether participants differ in the extent to which they benefit from the need-crafting program, thereby attending to the role of program engagement. Previous prevention-based research identified program engagement as a crucial factor affecting the effectiveness of prevention programs, thereby indicating that participants showing high levels of program engagement benefit more from programs, compared to participants who are only passively or minimally following the program (e.g., Calear et al., 2013; Hansen et al., 2019; Low et al., 2014; Lyubomirsky et al., 2011). With regard to need-based programs more specifically, Sheldon et al.'s, (2010) experimental study found a positive link between the encouraged pursuit of need satisfying goals and individuals' well-being only among participants who displayed persistent efforts to meet their goals.

The Present Study

The current study aimed to provide a preliminary test of the effectiveness of LifeCraft, an online program targeting individuals' need crafting skills, during the COVID-19 pandemic. To control for contextual and temporary influences on the effects of the program, we included a passive control condition in the study, which was especially critical during the COVID-19 crisis as individuals' needs and mental health varied considerably as a function of changing medical circumstances and introduced sanitary measures. Three main research questions were central to the current research.

First, the present study aimed to investigate the effects of the program on participants' need crafting skills (i.e., the mechanism of the program), need-based experiences (i.e., the primary outcome) and on their well-being and ill-being (i.e., the secondary outcome). We expected that participants in the experimental condition, relative to participants in the control condition, would engage more in need crafting and would experience higher need satisfaction and well-being

and lower need frustration and ill-being immediately after the program. Further, we expected that the observed benefits in the experimental group would remain stable one week and one month after the end of the program, signaling that gains are not short-lived but are maintained across time. Second, we examined the role of participants' program engagement. We expected that especially participants who were highly engaged would benefit more from the positive effects of the program (Hypothesis 2). Third, we formally examined whether need crafting is the mechanism of the program, with program-induced changes in need crafting mediating changes in the primary and secondary outcomes (Hypothesis 3).

Method

Participants

Participants were Dutch-speaking Belgian adults randomly selected out of a broader sample of people who participated in a large-scale study on psychological well-being during the COVID-19 crisis (i.e., the Motivation Barometer study, see <https://motivationbarometer.com/en/onderzoek/>) and who were willing to participate to follow-up research. The only inclusion criterion was that participants were between 26 and 85 years old. After the random selection of participants, participants were randomly assigned to the experimental condition or the passive control condition. Participants were contacted by e-mail to invite them to participate and to inform them about the content and goals of the study. Specifically, participants assigned to the experimental condition were invited to participate in an online program that aimed to strengthen their mental health during the COVID-19 crisis. Participants assigned to the control condition were invited to a follow-up survey study investigating individuals' well-being during the COVID-19 pandemic. When the study was finished, all participants of the control condition were informed about the overarching research objectives and were given the opportunity to follow the program. Active informed consent was obtained from all participants. Participation was voluntary and confidentiality was guaranteed. Ethical approval for this study was granted by the organizing university's Institutional Review Board (IRB; 2020/62).

We contacted a total of 2600 adults and we deliberately assigned more participants to the experimental condition than to the control condition (with a ration of about 3:2) because we observed in previous pilot studies that the participation grade was much lower in the experimental condition compared to the control condition. Of the initial participants that were contacted, 871 adults filled out the baseline measurement, of which 398 participants were part of the experimental condition and 473 participants were part of

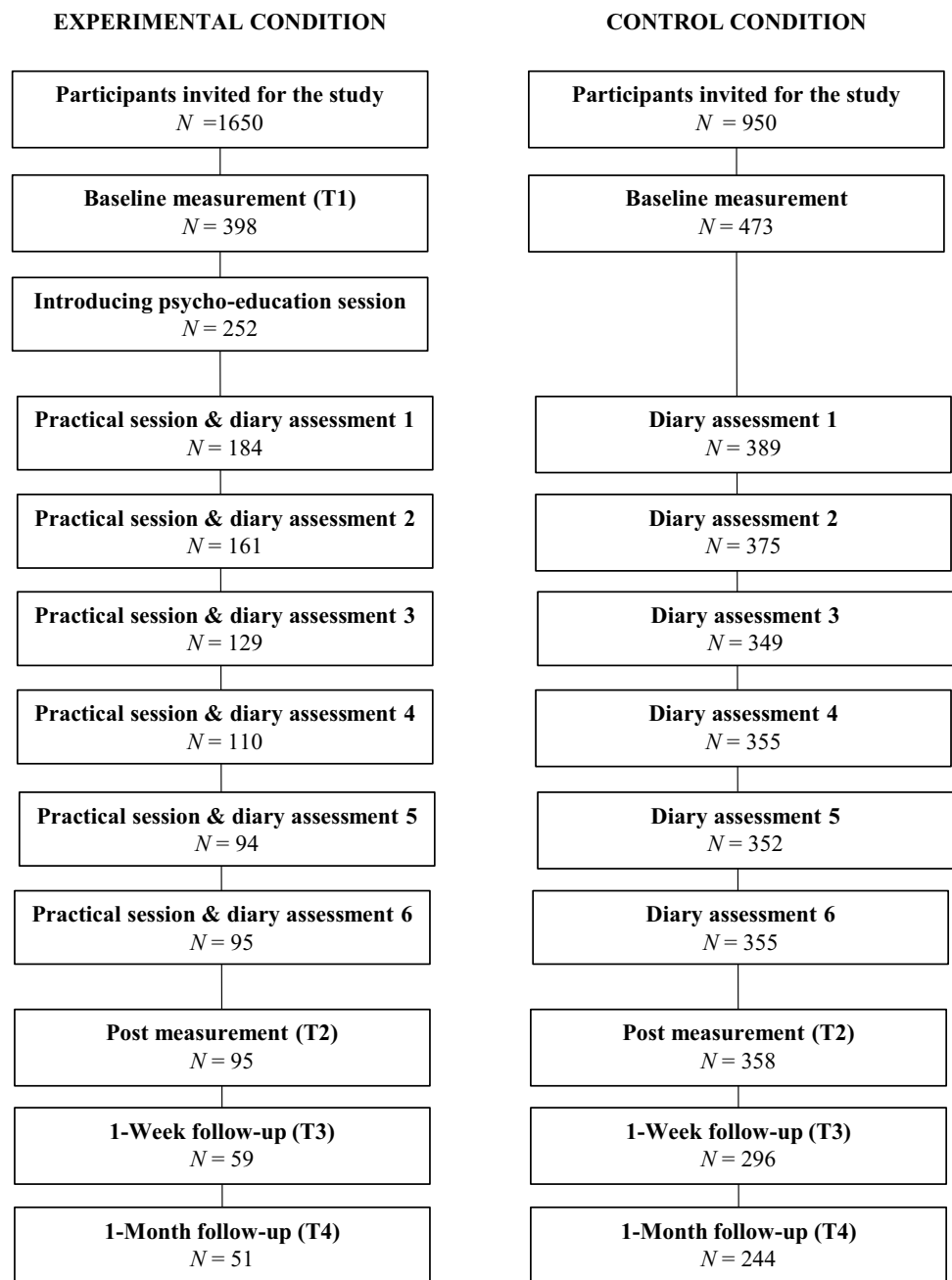
the control condition. Yet, out of the 398 participants in the experimental condition who filled out the baseline measurement, 146 participants did not start the program after filling out the baseline measurement and were excluded from the sample. The final sample consists of 725 participants ($N_{exp} = 252$; $N_{con} = 473$). Figure 1 shows the retention of participants across the several stages of the study. The mean age of the participants was 51.67 years ($SD = 13.52$, $range = 26-85$) and the sample was 68.55% female. Some participants indicated that they currently received psychological help (12.28%) or had received help in the past (45.52%). Regarding employment, 57.66% of the participants were employed.

Procedure

Participants assigned to the experimental condition followed a Dutch online program, LifeCraft, consisting of six practical sessions (± 10 min) followed by a homework assignment and a seventh reflective session. Table 1 provides detailed information about the content of this online program. Each practical session consisted of an instruction video about a basic need and the accompanying daily challenge (i.e., *homework assignment*) that participants were supposed to execute, a brainstorm exercise about one basic psychological need (session 1–3) or a testimony (session 4–6), and an action plan exercise concerning the homework assignment (sessions 1–6). Session 7 involved booster exercises with an option to make a personal action plan. On top of that, the first session also contained an animated psycho-education video about the theoretical background of LifeCraft. The homework assignment and the action plan exercise aimed to increase the execution of need crafting intentions (i.e. the action component), whereby the action plan was based on the implementation literature (Gollwitzer, 1999; Gollwitzer & Brandstätter, 1997; Koestner et al., 2002). The other elements of the program were developed to increase the awareness component of need crafting to facilitate the selection of need-satisfying activities. Participants got access to each session through a daily automatic e-mail with the link to the next session. Participants were free to attend the training at a time of their choice, but were asked to complete the whole program within 7 to 14 days.

To assess the immediate and short term effectiveness of the LifeCraft program, participants were asked to fill out a battery of questionnaires at four moments in time through an online application (i.e., Qualtrics), which was the same application as used for the online program itself. The baseline assessment took place at the start of the program (T1; December 2020), the post assessment at the end of the program (T2), and the follow-up assessments at one week (T3) and one month (T4) after the end of the program. Also, a short diary assessment was administered each day during the

Fig. 1 Flow of participants through the study



program to assess the degree to which participants managed to effectively execute their daily planned need-satisfying activity.¹ Participants in the control condition filled out the same battery of questionnaires at the same time and in the same way as participants in the experimental condition, but did not go through the program.

Measures

At each measurement wave, a similar battery of questionnaires was administered. An exception was the measurement of program engagement, which was assessed during the six daily assessments after each of the practical sessions. We asked participants to answer the questions regarding the

¹ The present study also assessed participants' daily need-based experiences. However, these data were not included in the current report as the focus of this study is on the enduring effectiveness of LifeCraft.

Table 1 Summary of program content

Session 1: Psycho-education session (10 min)	(1) Introduction to the program (2) Facilitating participants' knowledge about basic psychological needs and need crafting	(1) Introduction of content and structure of the program and introduction of the interventionist (film clip presented by interventionist) (2) Psycho-education on the basic psychological needs and their role in individual's psychosocial well-being (animated film clip); Psycho-education on how individuals could nurture their own need-based experiences (animated film clip)
Session 2, 3, 4 (basic sessions) (10 min + homework assignment)	(1) Facilitating participants' awareness to their needs (2) Encourage participants to engage in a need-satisfying activity (homework assignment): (3) Facilitating participants' goal attainment	(1) Psycho-education on the application of the need in daily life (film clip presented by interventionist); Reflection exercise on participants' own need-based experiences; Brainstorm exercise on activities that nurture that need (2) Homework assignment instructing participants to engage the next day in an activity that satisfy the highlighted need (e.g., "engage in an activity you really feel like doing"; autonomy (session 2)) (3) Psycho-education on the importance of concretizing goals (film clip presented by interventionist); Exercise on concretize their own activities of the homework assignment (i.e., what, when, were, with whom)
Session 5, 6, 7 (in-depth sessions) (10 min + homework assignment)	(1) Facilitating participants' awareness to their needs (2) Encourage participants to engage in a need-satisfying activity (homework assignment) (3) Facilitating participants' goal attainment	(1) More in-depth psycho-education on the highlighted need (film clip presented by interventionist); Alternative applications of the need in daily life (film clip presented by interventionist) (2) Homework assignment instructing participants to engage the next day in an alternative activity that satisfy the highlighted need (e.g., "engage in an activity that matches with your values"; autonomy (session 5)) (3) Psycho-education on possible obstacles that keep participants from nurturing their own needs and on solutions to handle this obstacles (peer testimony film clip); Reflection exercise identifying personal obstacles
Session 6: relatedness Session 7: competence	(1) Facilitating long-term changes in participants' need-based functioning (2) Facilitating participants' independent need-based functioning	(1) Structured questions including reflections on what they learned and personalized tips for themselves (e.g., What stays with you about the program; What advice would you like to give yourself in future). Participants received their own advice three weeks after the end of the workshop by e-mail (2) Tool to make a personal action plan (optional): setting goals for the next week, concretize this goals (i.e., what, when, were, with whom)
Booster exercises (included in post-assessment)		

Table 2 Descriptive Statistics and Internal Consistencies of Key Constructs at Four Waves

	Means				Standard Deviation				Internal Consistencies				Range			
	M_{T1}	M_{T2}	M_{T3}	M_{T4}	SD_{T1}	SD_{T2}	SD_{T3}	SD_{T4}	α_{T1}	α_{T2}	α_{T3}	α_{T4}	Min-Max $_{T1}$	Min-Max $_{T2}$	Min-Max $_{T3}$	Min-Max $_{T4}$
Need crafting	4.99	5.12	5.07	5.04	1.02	1.11	1.18	1.18	.80	.88	.88	.88	1.0–7.00	1.17–7.00	1.00–7.00	1.00–7.00
Need satisfaction	3.61	3.71	3.71	3.65	.63	.68	.73	.73	.80	.86	.87	.87	1.17–5.00	1.00–5.00	1.00–5.00	1.00–5.00
Need frustration	2.39	2.29	2.18	2.26	.74	.73	.78	.83	.81	.85	.87	.87	1.00–4.50	1.00–4.50	1.00–4.83	1.00–5.00
Well-being	2.53	2.60	2.64	2.61	.85	.87	.87	.90	.87	.89	.89	.90	1.00–4.00	1.00–4.00	1.00–4.00	1.00–4.00
Ill-being	1.73	1.67	1.65	1.67	.56	.60	.58	.66	.84	.86	.85	.88	1.00–3.86	1.00–3.71	1.00–3.86	1.00–4.00

past week. Cronbach's alphas of the scales are presented in Table 2.

Need Crafting

Participants filled out six items of the Need Crafting Scale (NCS; Laporte et al., 2021a), with two items tapping into the crafting of each of the three needs. Within each of the needs, there was one item tapping into the awareness component (e.g., “*It was clear to me in which activities I can use my capacities effectively*”, for competence) and one item tapping into the action component (e.g., “*I contacted people who are dear to me*”, for relatedness). Items were scored on a 7-point Likert scale, ranging from 1 (*completely not true*) to 7 (*completely true*).

Need-Based Experiences

Participants' need-based experiences were assessed using the 12-item short version of the BPNSNF-scale (BPNSNF; Chen, Van Assche, et al., 2015; Chen, Vansteenkiste, et al., 2015). For each need, there were two items tapping into satisfaction (e.g., “*I felt free to choose which activities I did*”, for autonomy satisfaction) and two items tapping into frustration (e.g., “*I often had doubts about whether I'm good at things*”, for competence frustration). Items were scored on a 5-point Likert scale going from 1 (*completely not true*) to 5 (*completely true*).

Well-Being

To measure well-being, participants completed one item (e.g., “*I was satisfied with my life*”) from the Satisfaction with Life Scale (SWLS; Diener et al., 1985) and three items (e.g., “*I looked forward to every day*”) of the Subjective Vitality Measurement (SVM; Ryan & Frederick, 1997). Participants rated items on a 4-point Likert scale going from 1 (*rarely or never*) to 4 (*usually or constantly*). Correlations between both scales ranged between 0.66 and 0.74 across the four waves. To create an overall score for well-being, both scales were standardized and averaged into a composite score.

Ill-Being

To assess ill-being, participants filled out a 6-item version (Van Hiel & Vansteenkiste, 2009) of the Center for Epidemiological Studies Depression Scale (CES-D; Radloff, 1977) (e.g., “*I could not get going*”) and one item (e.g., “*I felt sleepy, drowsy or dull*”) of the Insomnia subscale of the Inventory of Depression and Anxiety Symptoms (IDAS; Watson et al., 2007). Items were scored on a 4-point Likert scale going from 1 (*rarely or never*) to 4 (*usually or constantly*). Correlations between both scales ranged between 0.54 and 0.67 across the four waves. To create an overall score for ill-being, both scales were standardized and averaged into a composite score.

Program Engagement

After each of the six practical sessions, participants in the experimental condition completed a single item targeting their performance of the homework assignment that day (i.e., “*To what extent did you succeed in your activity today?*”). Items were scored on a 5-point Likert scale ranging from 1 (*completely not performed*) to 5 (*completely performed*).

Plan of Analysis

The main hypotheses were examined using latent change models (i.e., LCMs) in Mplus 8.4. (Muthén & Muthén, 2017). To estimate absolute change between the assessments, these models include latent variables for both intercepts (i.e., level) and slopes (i.e., change over time) (Beyers & Goossens, 2008; De Clercq et al., 2020). To evaluate the goodness of fit of the LCMs, we used a combination of the Root-Mean-Square Error of Approximation (RMSEA), the Standardized-Root-Square Residual (SRMR) and the Comparative Fit Index (CFI), with a combination of RMSEA value below 0.08, SRMR value below 0.08 and CFI value of 0.90 or more suggesting a good model fit (Hu & Bentler, 1999; Kline, 2005). Further, Little's, (1988) missing completely at random (MCAR) test on the variables of interest yielded a normed chi-square of 1.19. According to

guidelines provided by Bollen, (1989), this indicates that data were probably missing at random and that the missing data could be estimated reliably.

First, we built a longitudinal measurement model describing the latent level and three latent change factors (i.e., change from T1 to T2, from T2 to T3 and from T3 to T4) for each of the five study variables (i.e., need crafting, need satisfaction, need frustration, well-being, and ill-being). As all variables were multidimensional constructs, we used an internal-consistency approach (Kishton & Widaman, 1994), thereby using the corresponding subscales as indicators for their latent factors. The need-specific subscales of need-crafting (i.e., autonomy, competence, and relatedness need crafting) were used as indicators of need crafting. Similarly, the three need-specific subscales were used as indicators of need satisfaction and need frustration. Life satisfaction and vitality were used as indicators of well-being and depressive symptoms and fatigue were used as indicators of ill-being.

Second, we estimated five univariate LCMs for all study variables separately. These models describe the mean-level change from T1 to T2, from T2 to T3, and from T3 to T4, thereby indicating whether the mean-level and change parameters vary significantly between participants.

Third, we estimated two structural versions of each LCM to test our main hypotheses. To examine the effects of condition on change in the study variables across all participants, a first series of LCMs was estimated including condition (i.e., dummy coded: 0 = control condition; 1 = experimental condition) as a predictor (see Fig. 2, Hypothesis 1). Next, we estimated a second series of LCMs to examine the role of participants' program engagement (see Fig. 2, Hypothesis 2). For this aim, we first created two groups within the experimental condition, with the one group including participants who were highly engaged and the other group including participants who were little engaged. In a first step, we recoded participants' daily scores (i.e., 1–5) of execution of the homework assignments into categorical variables, thereby recoding scores of 3 or below (i.e., "I executed the homework assignment partially" to "I completely did not execute the homework assignment") as low participation and scores of 4 or above (i.e., "I executed the homework assignment fairly well" to "I completely executed the homework assignment") as high participation. In a second step, we assigned participants who participated highly to the majority of the six homework assignments (i.e., ≥ 4 sessions) to the *high engagement group* ($n = 72$, 28.57 %) and participants who displayed low participation to a majority of the homework assignments (i.e., ≤ 4 sessions) to the *low engagement group* ($n = 180$, 71.43 %). Next, two dummy variables were created, with the first dummy contrasting the control group with the *high engagement group* (i.e., contrast 1) and with the second dummy contrasting the control group with the

low engagement group (i.e., contrast 2). Both contrasts were then included as predictors in the LCMs.

Finally, we estimated a serial mediation LCM to investigate the mediating role of changes in need crafting in program effects on changes in need-based experiences and mental health (Hypothesis 3). As shown in Fig. 2, this model included the two dummy variables representing the condition effects (i.e., contrast 1 and contrast 2) as predictors of T1-to-T2 change in need crafting, which then predicted T1-to-T2 change in need-based experiences (i.e., need satisfaction and need frustration) which, in turn, predicted T1-to-T2 changes in the mental health outcomes (i.e., well-being and ill-being). The significance of indirect effects was computed using the Model Indirect command in Mplus.

Results

Preliminary Analyses

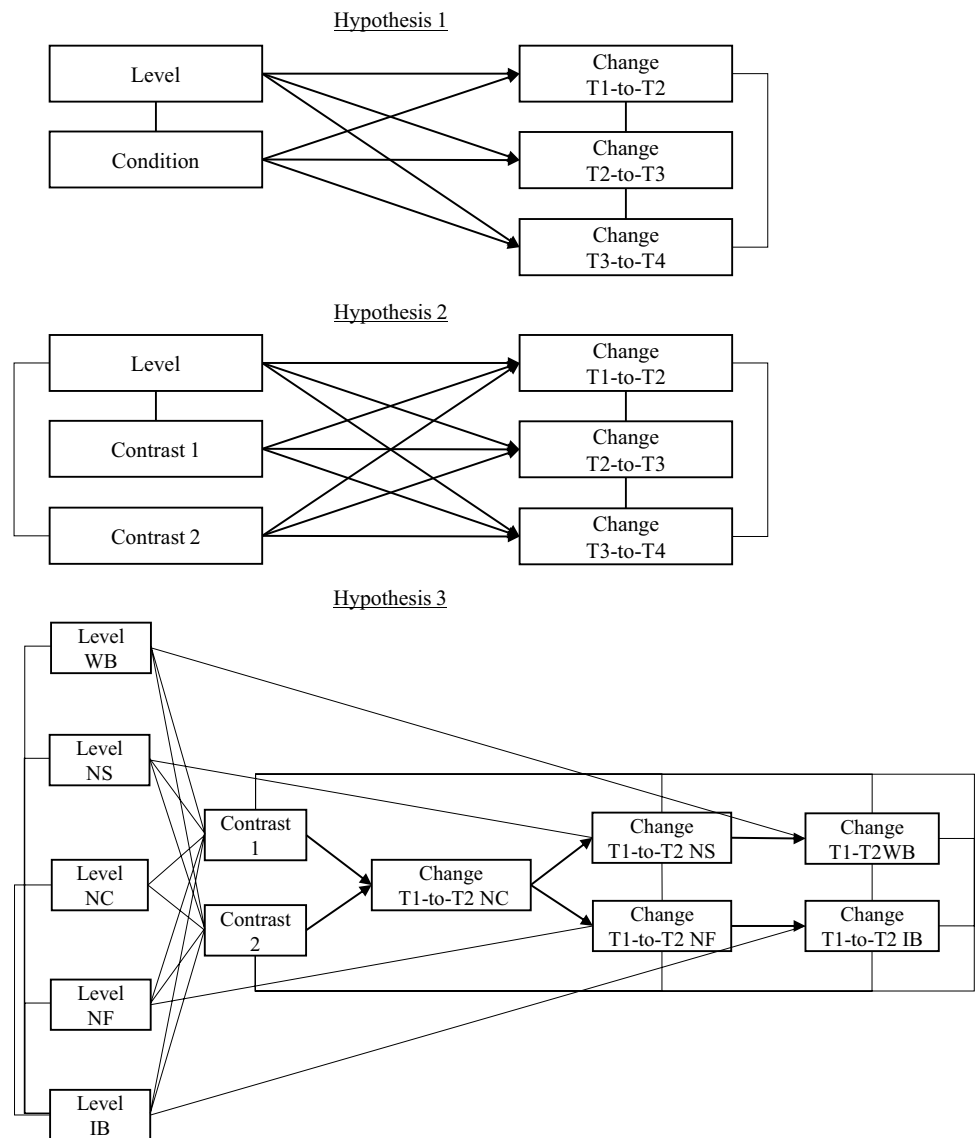
Background Characteristics

Descriptive information of the study variables is presented in Table 2 and the correlations between all variables are presented in Table 3. To investigate the associations between the background variables (i.e., gender, age, employment, psychological help in the past and psychological help in the present) and the study variables, we conducted a MANCOVA with gender, employment, previous psychological help and current psychological help as fixed factors, with age as a covariate, and with the study variables as dependent variables. There were no overall effects for gender (Wilks's $\lambda = 0.90$, $F(21,246) = 1.25$, $p = 0.21$), age (Wilks's $\lambda = 0.89$, $F(21,246) = 1.39$, $p = 0.13$), employment (Wilks's $\lambda = 0.94$, $F(21,246) = 0.80$, $p = 0.72$), psychological help in the past (Wilks's $\lambda = 0.92$, $F(21,246) = 1.05$, $p = 0.41$) nor for psychological help in the present (Wilks's $\lambda = 0.92$, $F(21,246) = 1.07$, $p = 0.39$).

Baseline Differences Between the Conditions

To examine baseline differences between the experimental condition and the control condition, we conducted a MANCOVA with condition as a fixed factor and with the study variables at T1 and the continuous background variable (i.e., age) as dependent variables. Results indicated that the overall multivariate effect of condition was non-significant (Wilks's $\lambda = 0.99$, $F(6,718) = 1.75$, $p = 0.11$). Further, we conducted a chi-square test to investigate differences between both conditions in terms of the categorical background variables (i.e., gender, employment, psychological help in the past, psychological help in the present). The results indicated that there were no differences between both

Fig. 2 Latent change models of hypothesis 1, 2 and 3. Note 1. NC = need crafting; NS = need satisfaction; NF = need frustration; WB = well-being; IB = ill-being; T1= baseline measurement; T2 = post measurement; T3 = 1-week follow-up measurement; T4 = 1-month followup measurement; Level = Intercept; Change = Slope; Contrast 1 = Dummy contrasting the control group with the high engagement group; Contrast 2 = Dummy contrasting the control group with the low engagement group. Note 2. Hypothesis 1 = Investigating the effects of the program on need crafting, need-based experiences and mental health 1 week and 1 month after the training; Hypothesis 2: Investigating whether especially participants who were highly engaged would benefit more from the positive effects of the program.; Hypothesis 3: Investigating whether need crafting is the mechanism of the program.



conditions in terms of gender ($\chi^2(1)=0.25, p=0.62$), employment ($\chi^2(1)=0.70, p=0.40$), psychological help in the past ($\chi^2(1)=0.53, p=0.47$) and psychological help in the present ($\chi^2(1)=3.371, p=0.05$). Overall, these analyses indicate that the randomization to the two conditions was successful.

Drop-Out Analyses

Next, to investigate whether dropout during the program was related to the study variables, we conducted a MANCOVA with drop-out (i.e., 0 = no drop-out during the program or daily assessments; 1 = drop-out during the program or daily assessments) as a fixed factor and with the study variables at T1 and the continuous background

variable (i.e., age) as dependent variables. Results indicated that there was an overall effect of drop-out (Wilks’s $\lambda = 0.98, F(8,716) = 2.09, p < 0.05$), with drop-out being related to the age of participants ($F(1,725) = 9.58, p < 0.01$) and to baseline levels of need satisfaction ($F(1,725) = 5.29, p < 0.05$). Specifically, participants who dropped out were younger ($M = 50.12$) and reported lower levels of need satisfaction ($M = 3.55$), compared to participants who stayed in the program ($M_{age} = 53.21; M_{ns} = 3.66$). Further, we conducted a chi-square test to investigate whether dropout during the program was related to the categorical background variables (i.e., gender, employment, previous psychological help, current psychological help). The results indicated that dropout was

Table 3 Correlations between Measured Constructs during Four Waves

	1a	2a	3a	4a	5a	6a	7a	1b	2b	3b	4b	5b	1c	2c	3c	4c	5c	1d	2d	3d	4d
Variables T1																					
1a. NC																					
2a. NS	.66***																				
3a. NF	-.78***																				
4a. WB	.65***	-.65***																			
5a. IB	-.64***	.73***	-.73***																		
Variables T2																					
1b. NC	.77***	.66***	-.54***	.48***	-.52***	-.32***	-.27***														
2b. NS	.68***	-.82***	-.72***	.64***	-.68***	-.44***	-.37***	.79***													
3b. NF	-.57***	-.73***	.82***	-.60***	.73***	.52***	.51***	-.64***	-.81***												
4b. WB	.62***	.68***	-.66***	.79***	-.70***	-.46***	-.36***	.66***	.74***	-.69***											
5b. IB	-.50***	-.61***	.65***	-.63***	.86***	.47***	.41***	-.57***	-.70***	.74***	-.69***										
Variables T3																					
1c. NC	.72***	.59***	-.48***	.48***	-.50***	-.33***	-.28***	.85***	.68***	-.58***	.62***	-.55***									
2c. NS	.65***	.75***	-.65***	.60***	-.64***	-.39***	-.38***	.74***	.82***	-.75***	.70***	-.65***	.76***								
3c. NF	-.56***	-.68***	.73***	-.56***	.68***	.50***	.49***	-.63***	-.75***	.80***	-.65***	.67***	-.65***	-.86***							
4c. WB	.61***	.66***	-.60***	.78***	-.71***	-.41***	-.35***	.61***	.70***	-.64***	.86***	-.67***	.61***	.71***	-.65***						
5c. IB	-.51***	-.65***	.68***	-.63***	.83***	.50***	.44***	-.56***	-.69***	.75***	-.68***	.82***	-.57***	-.74***	.79***	-.75***					
Variables T4																					
1d. NC	.73***	.62***	-.52***	.51***	-.52***	.28***	-.28***	.82***	.69***	-.61***	.63***	-.53***	.82***	.71***	-.59***	.59***	-.54***				
2d. NS	.66***	.75***	-.70***	.61***	-.67***	-.45***	-.41***	.73***	.81***	-.74***	.69***	-.64***	.70***	.81***	-.76***	.67***	-.69***	.79***			
3d. NF	-.59***	-.71***	.78***	.78***	.73***	.53***	.49***	-.61***	-.76***	.84***	-.68***	.71***	-.59***	-.73***	.81***	-.66***	.74***	-.64***	-.81***		
4d. WB	.56***	.65***	-.65***	-.63***	-.68***	-.51***	-.43***	.58***	.68***	-.66***	.83***	-.64***	.55***	.65***	-.65***	.83***	-.69***	.63***	.71***	-.72***	
5d. IB	-.50***	-.63***	.68***	.45***	.82***	.55***	.47***	-.53***	-.68***	.71***	-.66***	.79***	-.53***	-.68***	.75***	-.71***	.85***	-.56***	-.74***	.81***	-.75***

Note. a = Time 1, b = Time 2, c = Time 3, d = Time 4; NC = need crafting, NS = need satisfaction, NF = need frustration, WB = well-being, IB = ill-being *** $p < .001$, ** $p < .01$, * $p < .05$

not related to employment ($\chi^2(1) = 0.45, p = 0.50$), previous psychological help ($\chi^2(1) = 1.18, p = 0.28$) and current psychological help ($\chi^2(1) = 0.59, p = .44$). Yet, the results showed that drop-out was related to gender ($\chi^2(1) = 9.89, p < 0.01$), with a higher percentage of female participants dropping out (53.72%), compared to male participants (41.07%).

Primary Analyses

We first estimated five univariate LCMs to investigate mean-level change and variability in change in each of the study variables (i.e., need crafting, need satisfaction, need frustration, well-being, ill-being). Table 4 presents an overview of the parameter estimates and fit indices for each study variable. Results indicated that from T1 to T2, mean levels of well-being and ill-being remained stable, whereas need crafting and need satisfaction increased and need frustration decreased. Also, the results showed that from T2 to T3 the mean-level of need crafting, need satisfaction, well-being and ill-being remained stable, while need frustration decreased. From T3 to T4, mean levels of need crafting and ill-being remained stable, whereas the results showed a decrease in need satisfaction and well-being and an increase in need frustration. Further, the results indicated significant variances in the slope for all latent variables, suggesting that there are substantial differences between persons in how the study variables changed over time. Importantly, the univariate LCMs for need crafting and need satisfaction did not show an optimal fit, so the results of these models need to be interpreted with caution.

Hypothesis 1: Overall Effectiveness of the Online Prevention Program

Figure 3 and Table 5 show the results of the models examining condition as a predictor of change in need crafting (i.e., the presumed mechanism of change), the need-based experiences (i.e., the primary outcomes), and the mental health outcomes (i.e., the secondary outcomes). First, we discuss the effect of condition on change in need crafting and the need-based experiences. The results demonstrated that condition related positively to T1-to-T2 change in need crafting, but not significantly to T1-to-T2 change in need satisfaction and need frustration. Specifically, participants assigned to the experimental condition reported increases in need crafting from T1 to T2, whereas participants in the control condition remained stable. Further, condition did not relate significantly to T2-to-T3 change, nor to T3-to-T4 change in any of the primary outcomes. Regarding the secondary outcomes, condition related positively to T1-to-T2 change in well-being, but not to

Table 4 Parameter Estimates and Fit indices of the Univariate Latent Change Models

	Parameter estimates						Fit indices				
	Change T1-to-T2		Change T2-to-T3		Change T3-to-T4		CFI	RMSEA	SRMR		
	M	s ²	M	s ²	M	s ²					
Need crafting	5.01 (.04)***	.82 (.08)***	.10 (.03)**	.22 (.04)***	-.02 (.03)	.17 (.04)***	-.08 (.04)	.34 (.07)***	.94	.08	.23
Need satisfaction	3.34 (.03)***	.22 (.02)***	.06 (.02)**	.04 (.01)**	.00 (.02)	.08 (.02)***	-.07 (.03)*	.12 (.03)***	.97	.05	.10
Need frustration	2.69 (.04)***	.48 (.04)***	-.06 (.03)*	.07 (.02)***	-.12 (.03)***	.14 (.03)***	.13 (.03)***	.13 (.03)***	1.00	.01	.03
Well-being	2.89 (.04)***	.72 (.04)***	03 (.03)	.20 (.03)***	.03 (.03)**	.08 (.03)**	-.08 (.03)*	.15 (.04)***	1.00	.00	.01
Ill-being	1.67 (.02)***	.24 (.02)***	-.02 (.02)	.04 (.01)***	-.02 (.02)	.07 (.02)***	.04 (.02)	.06 (.02)**	1.00	.02	.03

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

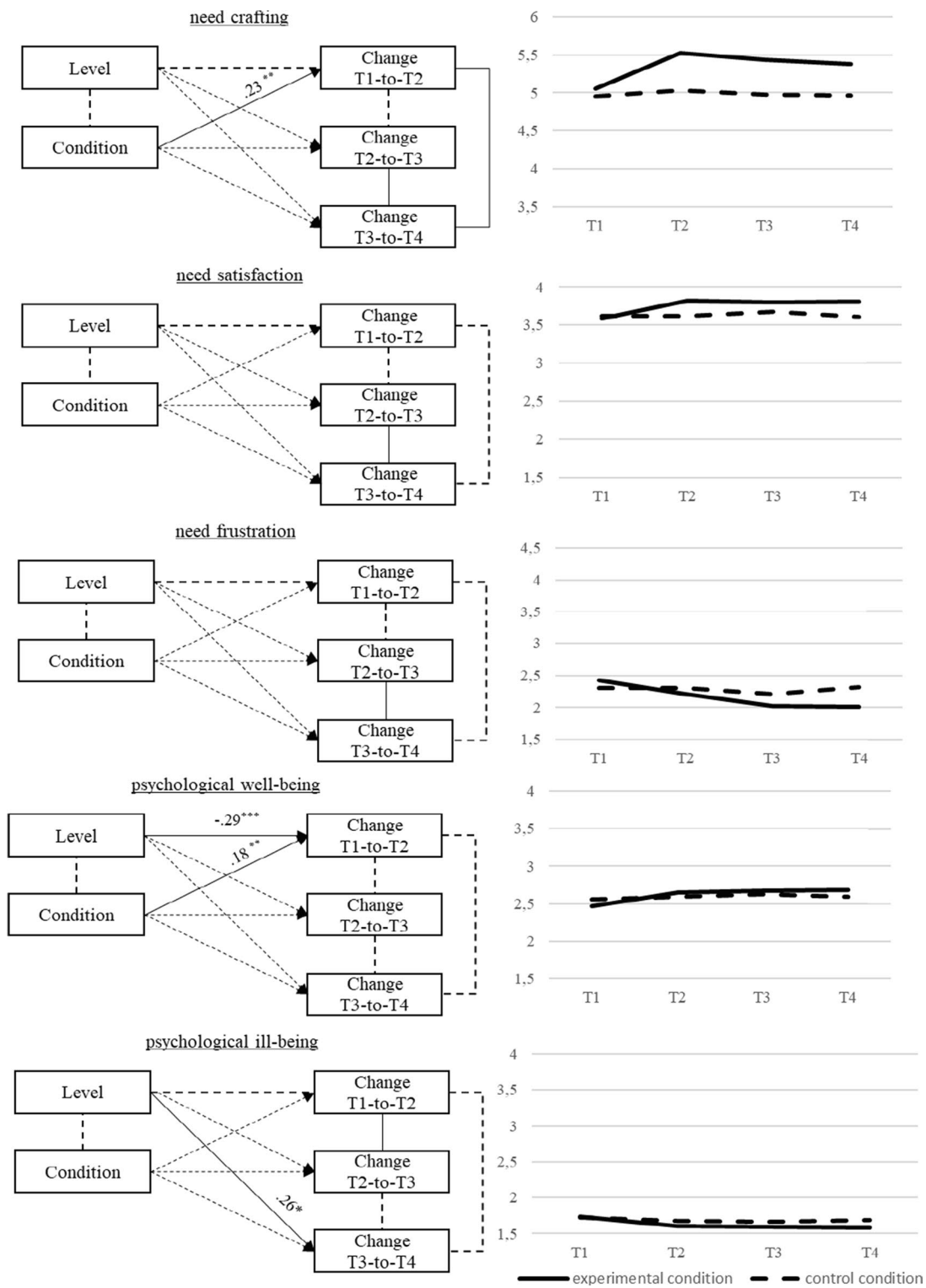


Fig. 3 Latent Change Models (Hypothesis 1)

any change in ill-being. Specifically, participants in the experimental condition showed increased well-being from T1 to T2, whereas participants in the control condition

remained stable. Next, condition was unrelated to any T2-to-T3 change and T3-to-T4 change in the secondary outcomes.

Table 5 Latent Change Models (Hypothesis 1)

	Change T1-to-T2		Change T2-to-T3		Change T3-to-T4	
	Level	Condition	Level	Condition	Level	Condition
	$\beta(SE)$	$\beta(SE)$	$\beta(SE)$	$\beta(SE)$	$\beta(SE)$	$\beta(SE)$
need crafting	.06 (.094)	.23 (.076)**	-.08 (.101)	-.14 (.089)	-.02 (.074)	-.00 (.093)
need satisfaction	.22 (.137)	.18 (.100) +	-.08 (.102)	-.09 (.090)	-.06 (.101)	.12 (.094)
need frustration	-.15 (.099)	-.10 (.092)	-.13 (.093)	-.12 (.090)	.14 (.107)	-.12 (.123)
well-being	-.29 (.051)***	.18 (.066)**	-.03 (.101)	-.10 (.124)	.01 (.087)	-.01 (.100)
ill-being	-.12 (.093)	-.08 (.081)	-.14 (.092)	.062 (.077)	.26 (.123)*	.00 (.095)

Note. *** $p < .001$, ** $p < .01$, * $p < .05$, + $p < .10$

Hypothesis 2: The Role of Program Engagement

To investigate the effects of program engagement on change in the outcomes across the time periods (T1-to-T2, T2-to-T3 and T3-to-T4), we conducted similar LCMs as for Hypothesis 1 but now differentiating between participants with low and high program engagement. Table 6 presents the results. First, we discuss the program effects on change in need-crafting and the need-based experiences for both the high engaged group (in comparison with the control condition, i.e. *contrast 1*) and the low engaged group (in comparison with the control condition, i.e. *contrast 2*). We found significant program-effects on T1-to-T2 change for the high engaged group in need-crafting, need satisfaction, and need frustration, while such program-effects were not found for the low engaged group. These findings indicate that participants who were highly engaged in the program, but not participants who were low engaged, reported greater increases in need crafting and need satisfaction and a greater decrease in need frustration from T1 to T2, compared to participants in the control condition, who remained stable. Regarding T2-to-T3 change and regarding T3-to-T4 change, we did not find any significant program-effects on change for either the high engaged group and low engaged group. These findings indicate that the immediate benefits of the program in participants' need crafting and need-based experiences remained stable over a period of one week and one month.

Second, we consider the program-effects on the secondary outcomes (i.e., well-being and ill-being) for both the high engaged group and low engaged group. The results showed a significant program-effect on T1-to-T2 change in well-being, but not in ill-being for the high engaged group. No program effects for the low engaged group were found on either T1-to-T2 change in well-being and T1-to-T2 change in ill-being. The findings mirrored those obtained for need crafting and the need-based experiences and indicate that participants who were highly engaged in the program reported increased well-being from T1 to T2, whereas participants who showed low engagement or participants in the control condition did not display any effects on well-being. Further, no

program-effects on change in ill-being from T2 to T3 nor on change from T3 to T4 were found for either the high engaged group and the low engaged group, indicating the obtained well-being benefits of the program did not dissipate across time.

Hypothesis 3: Need Crafting as the Mediating Mechanism of the Program

The third aim was to test whether need crafting is an intervening variable explaining the program-effects on need-based experiences and mental health. The results of a serial mediation LCM (RMSEA = 0.07, CFI = 0.92, SRMR = 0.10) are presented in Fig. 4. We only discuss the results regarding the group of highly engaged participants, as we only found program-effects for in this group in our testing of Hypothesis 2.

The results show that the program-effect on need crafting (i.e., the T1-to-T2 change in need crafting) was positively related to T1-to-T2 change in need satisfaction and negatively to T1-to-T2 change in need frustration. In turn, T1-to-T2 change in need satisfaction was positively related to T1-to-T2 change in well-being, whereas T1-to-T2 change in need frustration was positively related to T1-to-T2 change in ill-being. Moreover, all indirect pathways in this model were statistically significant. Specifically, the indirect pathway from the program-effect on T1-to-T2 change in well-being via T1-to-T2 change in need crafting and need satisfaction ($b = 0.14$, $SE = 0.050$, $p < 0.01$), as well as the indirect pathway from the program-effect on T1-to-T2 change in ill-being via T1-to-T2 change in need crafting and need frustration were significant ($b = -0.10$, $SE = 0.039$, $p < 0.05$). The original direct program-effects for the high engaged group on need satisfaction, need frustration and well-being disappeared after taking into account the indirect associations through need crafting (and through need-based experiences).

Table 6 Latent Change Models (Hypothesis 2)

	T1-to-T2 Change			T2-to-T3 Change			T3-to-T4 Change			
	β (SE)	β (SE)	β (SE)	Level	β (SE)	Contrast 1	Contrast 2	Level	β (SE)	Contrast 1
Need crafting	.16 (.033)***	-.02 (.039)	-.15 (.067)*	.15 (.042)***	.01 (.150)	-.12 (.062)	.04 (.140)	-.02 (.077)	.02 (.065)	-.12 (.157)
Need satisfaction	.06 (.040)	-.08 (.044)	.10 (.112)	.13 (.067)*	-.03 (.177)	-.07 (.069)	-.02 (.126)	-.05 (.101)	.08 (.072)	.08 (.144)
Need frustration	-.06(.042)	.06 (.045)	-.10 (.094)	-.13 (.066)*	.25 (.166)	-.07 (.063)	-.15 (.140)	.17 (.109)	-.08 (.083)	-.17 (.246)
Well-being	.01 (.043)	-.09 (.041)*	-.30 (.050)***	.15 (.051)**	.01 (.083)	-.08 (.092)	-.04 (.197)	.01 (.087)	-.03 (.062)	.09 (.234)
Ill-being	-.08 (.036)*	.06 (.043)	-.12 (.094)	-.07 (.061)	.00 (.113)	.02 (.055)	.127 (.117)	.25 (.121)*	.05 (.061)	-.21 (.200)

Note. Contrast 1 = control condition versus high engagement group; Contrast 2 = control condition versus low engagement group; *** $p < .001$, ** $p < .01$, * $p < .05$

Discussion

Effectiveness of the Online Prevention Program LifeCraft

The overall aim of this study was to test the effectiveness of an online prevention program targeting the capacity for need crafting (LifeCraft) during the COVID-19 pandemic. A first specific goal was to examine whether this online program would contribute to individuals' need crafting skills and need-based experiences. The current study provided evidence for the effectiveness of the LifeCraft program in strengthening participants' need-crafting skills as those participants who followed the program (including homework assignments) reported to engage significantly more in need crafting compared to participants in the control group. As the effect on need crafting remained stable over a period of one month, the benefits of the program were not fleeting but lasted for at least one month. A similar adaptive pattern was found for participants' well-being (but not on ill-being), with participants who followed the program experiencing increased well-being at the end of the program, compared to participants in the control condition, who remained stable. Overall, it is important to note that the effects observed were only small to medium in terms of effect size (Acock, 2008). This finding is consistent with previous meta-analyses, which found that universal prevention programs often show weaker effects compared to selective or targeted programs (e.g., Sanchez et al., 2018; Stice et al., 2007, 2009).

Nonetheless, these rather small-sized effects were qualified by participants' level of engagement. Consistent with previous research (Sheldon et al., 2010) we found that only participants who actively participated to the homework assignments benefit from LifeCraft. Specifically, after completing the program and successfully executing a majority of the homework assignments, participants reported to engage more in need crafting and experienced greater need satisfaction and lower need frustration. Also, the results showed that these participants experienced additional increases in well-being (but no decreases in ill-being) at the end of the program. In contrast, participants who followed the entire program, but who only completed a minority of the homework assignments did not reap any beneficial effects of the program.

The observation that the main effect of the LifeCraft program in the entire sample was rather limited, together with the fact that those actively involved clearly reaped benefits, indicate that active practicing at home seems a pre-requisite for the program to be effective. These findings suggest that psycho-education alone is not sufficient to uplift individuals' need-based functioning. The strength of the program lies not only in knowing what to do, but also in actually doing these activities.

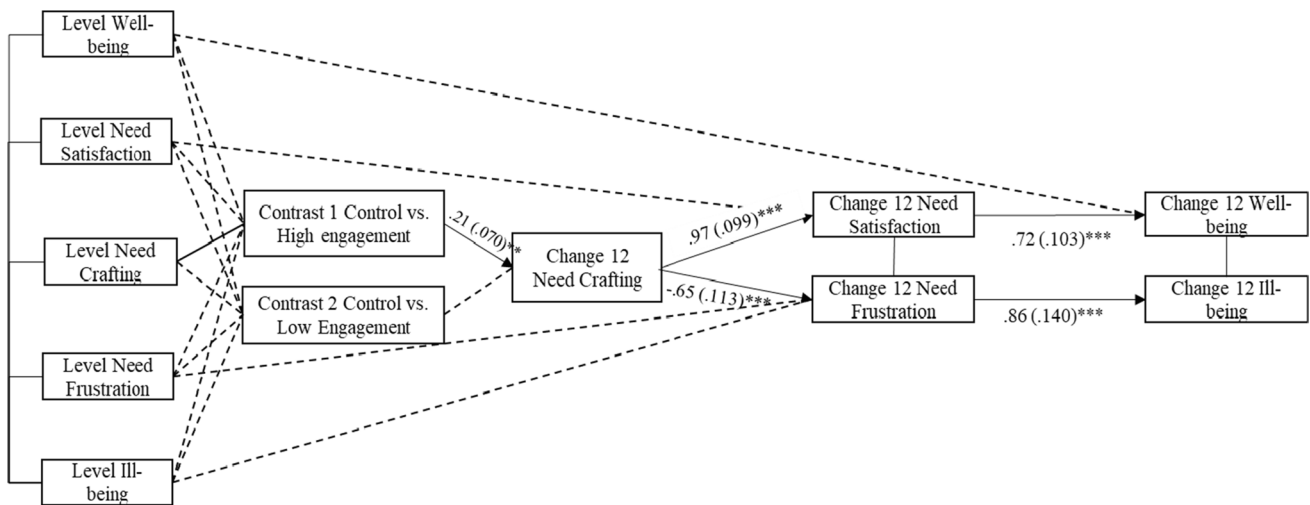


Fig. 4 Latent Change Model (Hypothesis 3)

Because changes in need crafting are assumed to be the working mechanism behind the effectiveness of the LifeCraft program, we formally examined whether the program effects for the high engaged participants on their need-based experiences and mental health could be explained by program effects on need crafting. As expected, program effects on need crafting were found to fully explain the program effects on participants’ need-based experiences. Moreover, through serial mediation analyses, we found that improvements in participants’ well-being can be explained by improvements in need satisfaction via program effects on need crafting. These results indicate that need crafting is indeed the driving mechanism behind the LifeCraft program.

When interpreting the results of the current study, it is important to bear in mind that only a limited number of participants completed the entire program. The relatively large drop-out from the program raises two concerns. The group of participants who completed the program may represent a selective subgroup of participants not entirely representative of the population. Participants who dropped-out were indeed found to score lower on need satisfaction at the baseline assessment. Although there were few other differences, there is a concern that people who completed the program may have more energy available to persist in the required homework assignments. Another concern deals with the implementation of the program in practice. With such substantial drop-out rates, the program apparently has a limited reach and even risks to miss people who need the program the most.

One explanation for the rather low participation rate, is that participants felt less related with the program as they had no personal contact with anyone of the researchers or other participants. Indeed, in other need-based experiments participants were in touch with the interventionist or even with other participants through daily meetings (Weinstein et al., 2016)

or through a WhatsApp group (Behzadnia & FatahModares, 2020). However, the downside of such personal contact is that those programs are more time-intensive, thereby creating difficulties to widely implement the programs.

A second possibility is that some participants lost their motivation during the program as the program did not sufficiently match with their time table, needs and skills. For instance, it is possible that the homework assignments were too time-consuming, overly challenging or too easy, or were not congruent with the interests of participants who dropped out. Future versions of this program could offer diverse levels of the homework assignments, so the participants have the freedom to adjust the exercises to their capacities, interests, and possibilities.

Limitations and Directions for Further Research

Although this work is a promising step in research on the online promotion of need-based experiences and mental health, the present work has also several limitations.

First, because participants’ need-based experiences and mental health are possibly affected by the stressors and lifestyle changes introduced by the pandemic (e.g., Šakan et al., 2020; Vermote et al., 2021), the current study does not allow for any claims about the effectiveness of the Life-Craft program outside the COVID-19 pandemic. It is, for instance, possible that a program targeting need crafting is more relevant during such stressful times, as it may have been a welcome support for individuals to seek alternative ways to satisfy their psychological needs while confronting the challenges of the pandemic. Accordingly, it remains an open question whether the observed effects would generalize to periods in which individuals’ psycho-social functioning is threatened less.

Second, the current findings uniquely relied on self-reported data, which can be subject to social desirability, response biases, and demand effects. As most of the targeted constructs (i.e., need satisfaction, need frustration, well-being and ill-being) are by definition subjective constructs, subjective appraisals are the standard to target these constructs. However, further research should do well by including other sources of data, such as partner ratings of need satisfaction and need crafting or physiological indicators of distress, such as blood pressure and cortisol levels.

A third shortcoming of the study is the absence of long term follow-up assessments. Although the data showed promising trends with participants' improvements in need crafting and need-based experiences immediately after the program being maintained one month after the end of the program, it remains unknown whether the online program could produce long-term changes in participants' need-based functioning. Follow-up assessments of at least six months are necessary to ensure that the adaptive effects of the training do not fade out over time. For such effects to occur, it will probably be necessary to repeat parts of the program or to organize booster sessions at regular moments.

A fourth shortcoming is the notable difference in the sample sizes of both conditions. While the control condition exists of 473 participants, the experimental condition contains only 252 participants. This difference is primarily due to the different response rates in the conditions. Although notable, such a difference can be expected given the higher time investment and commitment required from participants in the experimental condition. To balance the level of investment between the experimental and control condition and possibly ending up with a similar drop-out rate across conditions, future research could use an active, instead of a passive control condition.

Fifth, the LCMs targeting need crafting did not show an acceptable fit, with especially the SRMR being too high (Hu & Bentler, 1999; Kline, 2005), thereby indicating that the model did not capture the data well. Therefore, these specific results need to be interpreted with some caution.

Conclusion

The current study provided initial and promising evidence for the effectiveness of the LifeCraft program on individuals' need-based functioning and well-being, thereby indicating that it is possible to uplift individuals' need crafting skills through online prevention. Moreover, the findings highlighted that active practicing at home is a pre-requisite for need-based prevention programs to be effective. This suggests that a two-component approach in prevention is preferred, with need-based programs ideally including both psycho-education to foster participants' need-oriented mindset and practical exercises to implement the trained

skills in daily life. However, it is important to note that the effect sizes of the program were rather small. Nonetheless, scholars have argued that even small statistical effects can be important when the programs are little time-consuming, thereby yielding great cost-effectiveness (Prentice & Miller, 1992). Considered from that viewpoint, it is indeed quite promising that a brief online program such as LifeCraft, consisting of seven short sessions, yields one-month gains in the need-based functioning and mental health of participants who managed to go through the program.

Authors' Contributions All authors contributed to the study conception and design. Material preparation and data collection were performed by Daphne van den Bogaard, Nele Laporte and Katrijn Brenning. The analyses were performed by Nele Laporte. The first draft of the manuscript was written by Nele Laporte and all authors commented on previous versions of the manuscript. All authors read and approved the final manuscript.

Funding This study was supported by the Research Foundation Flanders (Fund number: 3G047220) and the Special Research Fund (Fund number: BOF.24Y.2019.0005.01).

Data Availability The data that support the findings of this study are openly available in Open Science Framework at <https://doi.org/10.17605/OSF.IO/7RV8D>

Declarations

Ethics Approval Ethical approval for this study was granted by the organizing university's Institutional Review Board (IRB; 2020/62).

Consent to Participate & Consent for Publication Participation was voluntary and confidentiality was guaranteed. Active informed consent was obtained from all participants. Specifically, participants gave their consent to participate in the study and to process and report their data anonymously.

Conflict of Interests 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.

References

- Acock, A. C. (2008). *A gentle introduction to Stata*. Stata press.
- Alzueta, E., Perrin, P., Baker, F. C., Caffarra, S., Ramos-Usuga, D., Yuksel, D., & Arango-Lasprilla, J. C. (2021). How the COVID-19 pandemic has changed our lives: A study of psychological correlates across 59 countries. *Journal of Clinical Psychology, 77*(3), 556–570. <https://doi.org/10.1002/jclp.23082>
- 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>
- Beyers, W., & Goossens, L. (2008). Dynamics of perceived parenting and identity formation in late adolescence. *Journal of*

- Adolescence*, 31(2), 165–184. <https://doi.org/10.1016/j.adolescence.2007.04.003>
- Blasco-Belled, A., Tejada-Gallardo, C., Torrelles-Nadal, C., & Alsinet, C. (2020). The costs of the COVID-19 on subjective well-being: An analysis of the outbreak in Spain. *Sustainability*, 12(15), 6243. <https://doi.org/10.3390/su12156243>
- Boden, M., Zimmerman, L., Azevedo, K. J., Ruzek, J. I., Gala, S., Magid, H. S. A., ... & McLean, C. P. (2021). Addressing the mental health impact of COVID-19 through population health. *Clinical Psychology Review*, 85, 102006. <https://doi.org/10.1016/j.cpr.2021.102006>
- Bollen, K. A. (1989). *Structural equations with latent variables* (Vol. 210). John Wiley & Sons.
- Brooks, S. K., Webster, R. K., Smith, L. E., Woodland, L., Wessely, S., Greenberg, N., & Rubin, G. J. (2020). The psychological impact of quarantine and how to reduce it: Rapid review of the evidence. *The Lancet*, 395(10227), 912–920. [https://doi.org/10.1016/S0140-6736\(20\)30460-8](https://doi.org/10.1016/S0140-6736(20)30460-8)
- Bueno-Notivol, J., Gracia-García, P., Olaya, B., Lasheras, I., López-Antón, R., & Santabàrbara, J. (2021). Prevalence of depression during the COVID-19 outbreak: A meta-analysis of community-based studies. *International Journal of Clinical and Health Psychology*, 21(1), 100196. <https://doi.org/10.1016/j.ijchp.2020.07.007>
- Calear, A. L., Christensen, H., Mackinnon, A., & Griffiths, K. M. (2013). Adherence to the MoodGYM program: Outcomes and predictors for an adolescent school-based population. *Journal of Affective Disorders*, 147(1–3), 338–344. <https://doi.org/10.1016/j.jad.2012.11.036>
- Cao, W., Fang, Z., Hou, G., Han, M., Xu, X., Dong, J., & Zheng, J. (2020). The psychological impact of the COVID-19 epidemic on college students in China. *Psychiatry Research*, 287, 112934. <https://doi.org/10.1016/j.psychres.2020.112934>
- Chen, B., Van Assche, J., Vansteenkiste, M., Soenens, B., & Beyers, W. (2015). Does psychological need satisfaction matter when environmental or financial safety are at risk? *Journal of Happiness Studies*, 16(3), 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., ... & Ryan, R. M. (2015b). Basic psychological need satisfaction, need frustration, and need strength across four cultures. *Motivation and Emotion*, 39(2), 216–236. <https://doi.org/10.1007/s11031-014-9450-1>
- Czeisler, M. É., Lane, R. I., Petrosky, E., Wiley, J. F., Christensen, A., Njai, R., ... & Rajaratnam, S. M. (2020). Mental health, substance use, and suicidal ideation during the COVID-19 pandemic—United States, June 24–30, 2020. *Morbidity and Mortality Weekly Report*, 69(32), 1049. <https://doi.org/10.15585/mmwr.mm6932a1>
- Deci, E. L., & Ryan, R. M. (2000). The "what" and "why" of goal pursuits: Human needs and the self-determination of behavior. *Psychological Inquiry*, 11(4), 227–268. https://doi.org/10.1207/S15327965PLI1104_01
- De Clercq, L. E., Dieleman, L. M., van der Kaap-Deeder, J., Soenens, B., Prinzie, P., & De Pauw, S. S. (2020). Negative Controlling Parenting and Child Personality as Modifiers of Psychosocial Development in Youth with Autism Spectrum Disorder: A 9-Year Longitudinal Study at the Level of Within-Person Change. *Journal of Autism and Developmental Disorders*, 51, 1–17. <https://doi.org/10.1007/s10803-020-04761-4>
- Diener, E. D., Emmons, R. A., Larsen, R. J., & Griffin, S. (1985). The satisfaction with life scale. *Journal of Personality Assessment*, 49(1), 71–75.
- Gollwitzer, P. M. (1999). Implementation intentions: Strong effects of simple plans. *American Psychologist*, 54(7), 493.
- Gollwitzer, P. M., & Brandstätter, V. (1997). Implementation intentions and effective goal pursuit. *Journal of Personality and Social Psychology*, 73(1), 186.
- Hansen, W. B., Fleming, C. B., & Scheier, L. M. (2019). Self-reported engagement in a drug prevention program: Individual and classroom effects on proximal and behavioral outcomes. *The Journal of Primary Prevention*, 40(1), 5–34. <https://doi.org/10.1007/s10935-018-00532-1>
- Hu, L. T., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling: A Multidisciplinary Journal*, 6(1), 1–55. <https://doi.org/10.1080/10705519909540118>
- Kawohl, W., & Nordt, C. (2020). COVID-19, unemployment, and suicide. *The Lancet Psychiatry*, 7(5), 389–390. [https://doi.org/10.1016/S2215-0366\(20\)30141-3](https://doi.org/10.1016/S2215-0366(20)30141-3)
- Khan, K. S., Mamun, M. A., Griffiths, M. D., & Ullah, I. (2020). The mental health impact of the COVID-19 pandemic across different cohorts. *International Journal of Mental Health and Addiction*. <https://doi.org/10.1007/s11469-020-00367-0>
- Kishton, J. M., & Widaman, K. F. (1994). Unidimensional versus domain representative parceling of questionnaire items: An empirical example. *Educational and Psychological Measurement*, 54(3), 757–765. <https://doi.org/10.1177/0013164494054003022>
- Kline, R. B. (2005). *Principles and practice of structural equation modeling*. Guilford Publications.
- Koestner, R., Lekes, N., Powers, T. A., & Chicoine, E. (2002). Attaining personal goals: Self-concordance plus implementation intentions equals success. *Journal of Personality and Social Psychology*, 83(1), 231.
- Laporte, N., Brenning, K., Vansteenkiste, M., Waterschoot, J., & Soenens, B. (2022). *A preliminary test of a brief training targeting need crafting: Effects on adolescents' psychological need-based experiences and mental health*. Unpublished manuscript, Ghent University.
- Laporte, N., Soenens, B., Brenning, K., & Vansteenkiste, M. (2021a). Adolescents as active managers of their own psychological needs: The role of psychological need crafting in adolescents' psychosocial adjustment. *Journal of Adolescence*, 88, 67–83. <https://doi.org/10.1016/j.adolescence.2021.02.004>
- Laporte, N., Soenens, B., Flamant, N., Vansteenkiste, M., Mabbe, E., & Brenning, K. (2021b). The role of daily need crafting in daily fluctuations in adolescents' need-based and affective experiences. *Motivation and Emotion*, 46. <https://doi.org/10.1007/s11031-021-09921-2>
- Little, R. J. (1988). A test of missing completely at random for multivariate data with missing values. *Journal of the American Statistical Association*, 83(404), 1198–1202. <https://doi.org/10.1080/01621459.1988.10478722>
- Low, S., Van Ryzin, M. J., Brown, E. C., Smith, B. H., & Haggerty, K. P. (2014). Engagement matters: Lessons from assessing classroom implementation of steps to respect: A bullying prevention program over a one-year period. *Prevention Science*, 15(2), 165–176. <https://doi.org/10.1007/s11121-012-0359-1>
- Lyubomirsky, S., Dickerhoof, R., Boehm, J. K., & Sheldon, K. M. (2011). Becoming happier takes both a will and a proper way: an experimental longitudinal intervention to boost well-being. *Emotion*, 11(2), 391. <https://doi.org/10.1037/2Fa0022575>
- Muthén, L. K., & Muthén, B. O. (2017). *Mplus User's Guide* (8th ed.). Muthén & Muthén.
- Neelam, K., Duddu, V., Anyim, N., Neelam, J., & Lewis, S. (2020). Pandemics and Pre-existing Mental Illness: A Systematic Review and Meta-analysis. *Brain, Behavior, & Immunity-Health*, 100177. <https://doi.org/10.1016/j.bbih.2020.100177>
- Nguyen, T. M., & Le, G. N. H. (2021). The influence of COVID-19 stress on psychological well-being among Vietnamese adults:

- The role of self-compassion and gratitude. *Traumatology*, 27(1), <https://doi.org/10.1037/trm0000295>
- Pan, K. Y., Kok, A. A., Eikelenboom, M., Horsfall, M., Jörg, F., Luteijn, R. A., ... & Penninx, B. W. (2021). The mental health impact of the COVID-19 pandemic on people with and without depressive, anxiety, or obsessive-compulsive disorders: a longitudinal study of three Dutch case-control cohorts. *The Lancet Psychiatry*, 8(2), 121–129. [https://doi.org/10.1016/S2215-0366\(20\)30491-0](https://doi.org/10.1016/S2215-0366(20)30491-0)
- Prentice, D. A., & Miller, D. T. (1992). When small effects are impressive. *Psychological Bulletin*, 112(1), 160–164. <https://doi.org/10.1037/00332909.112.1.160>
- 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>
- Ryan, R. M., & Deci, E. L. (2017). *Self-determination theory: Basic psychological needs in motivation, development, and wellness*. Guilford Publications.
- Ryan, R. M., & Frederick, C. (1997). On energy, personality, and health: Subjective vitality as a dynamic reflection of well-being. *Journal of Personality*, 65(3), 529–565. <https://doi.org/10.1111/j.1467-6494.1997.tb00326.x>
- Ryan, R. M., Soenens, B., & Vansteenkiste, M. (2019). Reflections on Self-Determination Theory as an organizing framework for personality psychology: Interfaces, integrations, issues, and unfinished business. *Journal of Personality*, 87(1), 115–145. <https://doi.org/10.1111/jopy.12440>
- 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>
- Sanchez, A. L., Cornacchio, D., Poznanski, B., Golik, A. M., Chou, T., & Comer, J. S. (2018). The effectiveness of school-based mental health services for elementary-aged children: A meta-analysis. *Journal of the American Academy of Child & Adolescent Psychiatry*, 57(3), 153–165. <https://doi.org/10.1016/j.jaac.2017.11.022>
- Sheldon, K. M., Abad, N., Ferguson, Y., Gunz, A., Houser-Marko, L., Nichols, C. P., & Lyubomirsky, S. (2010). Persistent pursuit of need satisfying goals leads to increased happiness: A 6-month experimental longitudinal study. *Motivation and Emotion*, 34(1), 39–48. <https://doi.org/10.1007/s11031-009-9153-1>
- Stice, E., Shaw, H., Bohon, C., Marti, C. N., & Rohde, P. (2009). A meta-analytic review of depression prevention programs for children and adolescents: factors that predict magnitude of intervention effects. *Journal of Consulting and Clinical Psychology*, 77(3), 486–503. <https://doi.org/10.1037/2Fa0015168>
- Stice, E., Shaw, H., & Marti, C. N. (2007). A meta-analytic review of eating disorder prevention programs: Encouraging findings. *Annual Review of Clinical Psychology*, 3, 207–231. <https://doi.org/10.1146/annurev.clinpsy.3.022806.091447>
- Tay, L., & Diener, E. D. (2011). Needs and subjective well-being around the world. *Journal of Personality and Social Psychology*, 101(2), 354–365. <https://doi.org/10.1037/a0023779>
- van der Kaap-Deeder, J., Vermote, B., Waterschoot, J., Soenens, B., Morbée, S., & Vansteenkiste, M. (2021). The role of ego integrity and despair in older adults' well-being during the COVID-19 crisis: The mediating role of need-based experiences. *European Journal of Ageing*. <https://doi.org/10.1007/s10433-021-00610-0>
- 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/10.2190/2FAG.68.1.b>
- Vansteenkiste, M., Ryan, R. M., & Soenens, B. (2020). Basic Psychological Need Theory: Trends, critical themes, and future directions. *Motivation and Emotion*, 44(1), 1–31. <https://doi.org/10.1007/s11031-019-09818-1>
- Vermote, B., Waterschoot, J., Morbée, S., van der Kaap-Deeder, J., Schrooyen, C., Soenens, B., ... & Vansteenkiste, M. (2021). Do Psychological Needs Play a Role in Times of Uncertainty? Associations with Well-Being During the COVID-19 Crisis. *Journal of Happiness Studies*. <https://doi.org/10.1007/s10902-021-00398-x>
- Watson, D., O'Hara, M. W., Simms, L. J., Kotov, R., Chmielewski, M., McDade-Montez, E. A., ... & Stuart, S. (2007). Development and validation of the Inventory of Depression and Anxiety Symptoms (IDAS). *Psychological Assessment*, 19(3), 253. <https://doi.org/10.1037/1077-729x.19.3.253>
- Weinstein, N., Khabbaz, F., & Legate, N. (2016). Enhancing need satisfaction to reduce psychological distress in Syrian refugees. *Journal of Consulting and Clinical Psychology*, 84(7), 645–650. <https://doi.org/10.1037/ccp0000095>
- WHO. (2021) *Covid-19 weekly epidemiological Update, Updated 7 December 2021*. Retrieved from World Health Organization: Retrieved from: <https://www.who.int/emergencies/diseases/novel-coronavirus-2019/situation-reports>
- Witteveen, D., & Velthorst, E. (2020). Economic hardship and mental health complaints during COVID-19. *Proceedings of the National Academy of Sciences*, 117(44), 27277–27284. <https://doi.org/10.1073/pnas.2009609117>

Publisher's Note Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.