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How to support college students' pro-active search for psychological need satisfaction? Testing an online intervention that fosters need crafting

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Abstract

Research within the framework of Self-Determination Theory (SDT) convincingly shows that support of individuals' basic needs for autonomy, relatedness, and competence yields manifold benefits. Recently, scholars have started to explore whether and how individuals can pro-actively steer their own need-based functioning, known as need crafting. The current preregistered intervention among college students (N = 582; M_{age} = 23.11) examined the effectiveness of LifeCraft, an online intervention program that aims to foster need crafting. In a randomized controlled trial LifeCraft is compared to a passive and an active control condition, with the latter targeting executive functioning. Results showed that LifeCraft predicted greater need satisfaction and lower need frustration relative to participants in the passive control group, but not those in the active control group. Changes in need-based functioning, in turn, predicted changes in well-being. Program benefits persisted one month later during a stressful exam period, but faded out during summer holidays. Participants who were highly engaged in the program reaped more benefits from the LifeCraft training. This work sheds light on the underexplored premise that individuals can proactively take action to satisfy their basic needs. Overall, the present study provides deeper insights into the conditions under which need crafting can be effectively trained, the circumstances in which students benefit from the training, and the individual differences that explain variability in its effectiveness.

Keywords College students · Need crafting · Basic psychological needs · Intervention · Well-being

Mental health problems among college students are of concern on college campuses (Lipson et al., 2019), as indicated by steadily rising levels of depressive symptoms (Duffy et al., 2019), eating disorder symptoms (Daly & Costigan, 2022), and suicidal ideation (Twenge et al., 2019). According to the World Health Organization (Brooks et al., 2020), it is important not only to focus on the prevention of mental health problems, but also to actively support and promote individuals' well-being. The absence of distress and ill-being does not necessarily imply the presence of well-being and adaptation (Tengland, 2010). Fostering well-being is important in its own right, but is also instrumental to strengthen students' capacity to cope with stressors, to help them actualize their capacities, and to contribute to the community (Brooks et al., 2020; Kazdin, 2024). To achieve this aim, it is essential to target psychological processes that are central in individuals' functioning. Self-Determination Theory (SDT; Ryan & Deci, 2017; Ryan et al., 2021) offers such an overarching framework by stating that the basic needs for autonomy, relatedness, and competence foster psychosocial adaptation and well-being, whereas frustration of these needs poses a risk for a broad range of problem behaviours and different types of psychopathologies (Ryan et al., 2016; Vansteenkiste & Ryan, 2013).

Despite the strong empirical evidence for the role of the basic psychological needs in mental health (Vansteenkiste et al., 2020, 2023), the vast majority of prevention-based work has focused on the social context to support these needs (e.g.,

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through interventions with parents, teachers, and coaches; e.g., Cheon et al., 2015). Only recently have scholars begun to develop intervention programs that directly target people's personal capacity to craft the satisfaction of their own basic needs (Laporte et al., 2024; van den Bogaard, Soenens, Brenning et al., 2024). The present research aims to contribute to this emerging field by examining the effectiveness of an e-health program entitled 'LifeCraft' among college students. LifeCraft participants are compared to participants in both a passive and active control condition, and followed-up during a stressful and a more relaxing period. Further, this study aims to gain more insights to whom this program is effective by looking at program engagement and individual differences in students' desire to get their basic needs met (Sheldon & Gunz, 2009).

The role of basic psychological needs in well-being

According to SDT, the satisfaction of three basic psychological needs is a prerequisite for people's well-being (Ryan et al., 2021), regardless of individuals' age (Lataster et al., 2022), gender (Rodríguez-Meirinhos et al., 2020) or cultural background (Church et al., 2013). The first basic need, *autonomy* denotes the experience of psychological freedom and choice in one's actions, feelings, and thoughts (Ryan & Deci, 2006). College students, for example, may experience autonomy when choosing which course material they focus on and how to organize breaks when preparing for their exams. The need for *relatedness* refers to the experience of relational warmth, mutual trust and care. When satisfied, individuals feel valued and cared for, while also reciprocally feeling they can value and care for others. For example, while preparing for the exams, college students can keep in touch with fellow students to support each other. Finally, the need for *competence* denotes the experience of mastery and efficacy, with individuals being capable of expressing and extending their capacities and achieving desired goals. To stay with the example of exams, students' competence gets satisfied through the acquisition of new knowledge and expertise, eventually leading to the successful completion of exams. Research showed that when students perceive their psychological needs as fulfilled, they report higher life satisfaction, vitality, and overall psychological health (Chen et al., 2015; Van de Casteele et al., 2024). Further, need satisfaction is also positively related to intrinsic motivation for learning (Goldman et al., 2017), academic performance (Niemiec & Ryan, 2009) and resilience (Waterschoot et al., 2024).

Further, when need satisfactions are strongly obstructed, students experience need frustration. For example, when students feel a lot of pressure from parents or teachers to perform well on their exams, they experience autonomy frustration. If students feel lonely while studying, or even feel rejected by peer students that do not react to their text messages, they experience relatedness frustration. If students fail to stick to their study schedule or have difficulty to understand the learning material, eventually leading to bad grades, they experience competence frustration. When students experience need frustration, they report more amotivation for learning (Bartholomew et al., 2018), intention to drop out of college (Evans & Liu, 2019), and poorer academic performance (Buzzai et al., 2021; Collie et al., 2019). Need frustration is, amongst others, also associated with disrupted sleep (Campbell et al., 2021), depressive complaints (Vandenkerckhove et al., 2020) and substance abuse (Richards et al., 2024).

Need crafting

Most research focused on the role of socialization figures, who can either support or undermine individuals' basic needs. Meta-analyses and narrative reviews convincingly demonstrated the growth-promoting role of teachers (Howard et al., 2024; Vasconcellos et al., 2020), parents (Vasquez et al., 2016), and sport coaches (Mossman et al., 2022).

Yet, individuals are not completely dependent on contextual support to get their needs met. They can also take action themselves (Laporte et al., 2021a, 2021b; Sheldon & Gunz, 2009). Basic needs not only serve as requirements for growth, they also provide direction to individuals' functioning, thus serving as guideposts for one's thought and action patterns (Vansteenkiste et al., 2020). One important way in which individuals display this proactive tendency is through engagement in need crafting (Laporte et al., 2021a, 2021b). Need crafting denotes the skill to foster one's own need satisfactions by selecting activities, relational partners and contexts that allow for greater need satisfaction, while minimizing need frustration. Need crafting involves a sense of *awareness* and self-knowledge regarding the circumstances, activities, and persons that are (potentially) need conducive for oneself. Equipped with this awareness, persons high in need crafting take intentional need-congruent *action* to get their needs for autonomy, relatedness and competence fulfilled. To illustrate, a student high in need crafting would, after realizing the importance of keeping in touch with a good friend from high school (awareness), take initiative to meet this friend (action).

Previous research showed that need crafting predicted higher need satisfaction, an effect observed both at the level of relatively stable interindividual differences and at the level of within-person change across a 1-year period

(Laporte et al., 2021a, 2021b). Testifying to the dynamic nature of need crafting, a diary study (Laporte et al., 2021a, 2021b) further showed that on days adolescents engaged in need crafting, they reported greater need satisfaction and better well-being that same day. Another diary study among adolescents pointed out that adolescents are more likely to formulate need crafting intentions in the morning after a night of good quality sleep, with these need crafting intentions predicting need satisfaction and vitality later that day (van den Bogaard et al., 2024).

In light of the benefits associated with need crafting and its dynamic nature, need crafting serves as a useful target for intervention and prevention. Although not necessarily framed from the angle of need crafting, prior intervention work indicated that strengthening individuals' skills to get their basic needs met yields benefits in terms of well-being. These intervention studies have been carried out in diverse populations, including Syrian refugees (Weinstein et al., 2016), adults in the general population (Cantarero et al., 2021) and college students (Behzadnia & FatahModares, 2020, 2023), with these interventions differing in emphasis and focus. Some of these interventions foster greater awareness (e.g., by giving reflection instructions; Cantarero et al., 2021), while others are more action-oriented (e.g., by providing a list of need-conducive activities; Weinstein et al., 2016). All of these interventions generated benefits for individuals' need-based experiences and well-being, with effects observed both in the short-term (pre-post; e.g., Behzadnia & FatahModares, 2020, 2023) and in the longer term (up to six months; e.g., Sheldon et al., 2010).

Previous research among adults (Laporte et al., 2024) and students (van den Bogaard, Soenens, Brenning et al., 2024) showed that need crafting can be trained by the online need crafting intervention 'LifeCraft'. The increase in need crafting of LifeCraft participants, in turn, predicted higher need satisfaction and better well-being compared to participants in a (waitlist) control group. Participants who benefitted most from LifeCraft were those who most actively engaged in the program. Furthermore, dropout was less common among participants who were autonomously motivated to enroll in the program, made use of digital support through WhatsApp and opted for a faster rollout of the program (van den Bogaard, Soenens, Brenning et al., 2024).

Given the limited number of intervention studies on need crafting, several important questions remain. First, it is critical to include an active control condition in addition to the passive control condition (i.e., no treatment or waitlist condition). The effect sizes observed in intervention programs are typically larger when the intervention is only compared to a passive control condition (e.g., Dunning et al., 2019; Firth et al., 2017). The inclusion of an active control condition is needed to ascertain that well-being benefits observed are robust and due specifically to the intervention. Any intervention (e.g., active control condition) may potentially lead to benefits which can be driven by participants' expectations to improve, demand and placebo effects, and more general factors like design features (e.g., use of videos) and duration of the intervention (Boot et al., 2013). If an active control condition is equal in framing (i.e., promoting well-being) and program features (i.e., design features and duration) compared to the experimental condition, it helps to shed light on the robustness of the intervention by ruling out overlapping non-specific mechanisms.

Second, to provide evidence for the sustainability of effects, it is critical that participants are followed over time. Until now, previous interventions that aimed to support participants in self-supporting their needs were conducted during a stressful period (e.g., Behzadnia & FatahModares, 2023; Laporte et al., 2024), after stressful events (e.g., Weinstein et al., 2016), or outside a stressful period (e.g., Sheldon et al., 2010). To more conservatively test the sustainability of the effects, in this study, students are trained a month before their exams to examine whether they still benefit from the training during the subsequent stressful period. In addition, to further explore the effects of a need crafting intervention, follow-up during a relaxed period (i.e., holidays) is included. Holiday time is typically a time when energetic resources get refilled, presumably because one is better able to get one's needs for autonomy and relatedness met during this period of the year (Kujanpää et al., 2021; Yan et al., 2024). It thus seems easier for people to pro-actively engage in need-fulfilling activities, making the added value of a need crafting training less pronounced during this period.

Third, the present study contributes to the question for whom the intervention works best by examining program effects in relation to individual differences in need desire. Need desire reflects people's wish to get their needs met (Sheldon & Gunz, 2009). Although the moderating role of need desire received some attention in prior work (Chen et al., 2015; Van Assche et al., 2018), the question whether need desire may potentially attenuate or exacerbate the effects of a need crafting intervention still needs to be explored. On the one hand, given that need frustration often underlies need desire (Chen et al., 2015; Sheldon & Schüler, 2011), one could reason that individuals with a stronger need desire may take more action to get their needs met as they experience a greater shortage. On the other hand, as need frustration is also associated with energy depletion (Vermote et al., 2022), individuals high in need desire may lack the energy to engage in need crafting.

The present study

Need crafting is a promising target for interventions aimed at enhancing students' well-being via satisfaction of their basic psychological needs. Yet, interventions that directly target need crafting are scarce and a more robust test of such interventions is needed. The present study investigates the effectiveness of the online LifeCraft intervention among college students in a randomized controlled trial with both a passive and an active control group. The LifeCraft intervention is expected to promote higher need satisfaction and well-being and lower need frustration and ill-being directly after the intervention compared to both the passive and active control condition, with improved need crafting serving as the working mechanism (Hypothesis 1). In the active control condition, only enhanced well-being is expected, as this intervention targets another working mechanism (i.e., executive functions; Allan et al., 2016). Next, we examine whether the expected benefits of the LifeCraft program persist during a stressful exam period one month later (Hypothesis 2). However, these benefits are expected to fade out during the summer holidays, as people generally get their needs better satisfied during a period of free time (Hypothesis 3; Kujanpää et al., 2021; Yan et al., 2024). Further, we examine two moderation effects. First, we hypothesize that program engagement influences effectiveness, with the benefits of LifeCraft especially manifesting among highly engaged individuals (Hypothesis 4; Laporte et al., 2024; Sheldon et al., 2010). Second, we aim to better understand who benefits most from the intervention by addressing the role of need desire (Sheldon & Gunz, 2009). The moderating role of need desire is examined in an explorative manner as hypotheses can be formulated in both directions (i.e., more benefits to obtain due to more need deficit, or less benefits obtained due to a lack of energy to engage in the program). Preregistration of this study can be found at #96,573| AsPredicted.

Method

Participants

An invitation to participate in the study was distributed across 5 Flemish universities and 13 colleges by a governmental organization that coordinates and supports inclusive education in Flanders (the Dutch-speaking part of Belgium). Students were reached via the standard communication channels of their colleges and universities (i.e., through e-mail, student platform or other media). Students received general information about the online study, saying that the study addressed the topic of psychological well-being. No rewards were given in return for participation, but students knew they would receive personalized feedback with respect to their basic psychological needs and well-being after the last follow-up assessment. Students filled out a questionnaire at baseline, at the end of the program, and one and 2,5 months after program ending. After the last follow-up, participants received complete information about the research design and the precise objectives of the study. At that moment, participants in both control conditions got the opportunity to participate in LifeCraft. Active informed consent was obtained from each participant prior to enrollment. Participation was voluntary and confidential treatment of collected data was guaranteed. Ethical approval for this study is granted by the Institutional Review Board (IRB; 2022/034) of the Faculty of Psychology and Pedagogic Sciences at Ghent University.

A total of 902 students registered for the study. Participants were randomly assigned to one of the three conditions. As a previous study (van den Bogaard, Soenens, Brenning et al., 2024) indicated a higher dropout rate in LifeCraft compared to the control group, we assigned 50 persons more to the active conditions (i.e., the LifeCraft condition and active control group) than to the passive control condition. Dropout rates in each condition per time point can be found in Fig. 1. Out of the 902 registered students, 582 participated at baseline, with the number of participants gradually decreasing across subsequent measurement waves. Dropout varied as a function of condition at Time 2 (directly following the online intervention), with a higher percentage of participants dropping out in the Experimental Condition (EC; 59.9%) and the Active Control condition (AC; 63.4%) compared to the Passive Control condition (PC; 28.2%). Despite substantial dropout in the active conditions, the absolute number of participants in each condition (i.e., $N_{Exp}=79$, $N_{AC}=71$, $N_{PC}=141$) remained sufficiently high. A power analysis indicated that a sample size of at least 150 participants $N=50$ per condition) is required to detect small to medium effect sizes ($d=0.30$; Cohen, 1988) with an alpha level of 0.05 and a power of 0.80. We anticipated small effect sizes based on meta-analyses of universal prevention programs (Sanchez et al., 2018; Stice et al., 2009) and previous need crafting interventions (Laporte et al., 2024; van den Bogaard, Soenens, Brenning et al., 2024).

The mean age of the participants was 23.11 years (SD = 5.86, range = 18–59), 84.4% of the participants identified with the female sex, 14.9% identified with the male sex and 0.7% identified otherwise. Most students indicated they received psychological counseling or intended to seek counseling (68.9%). Among the remaining group, 19.7% of the participants had the intention to look up or already looked up information about well-being, and 11.4% answered they never looked for psychological information

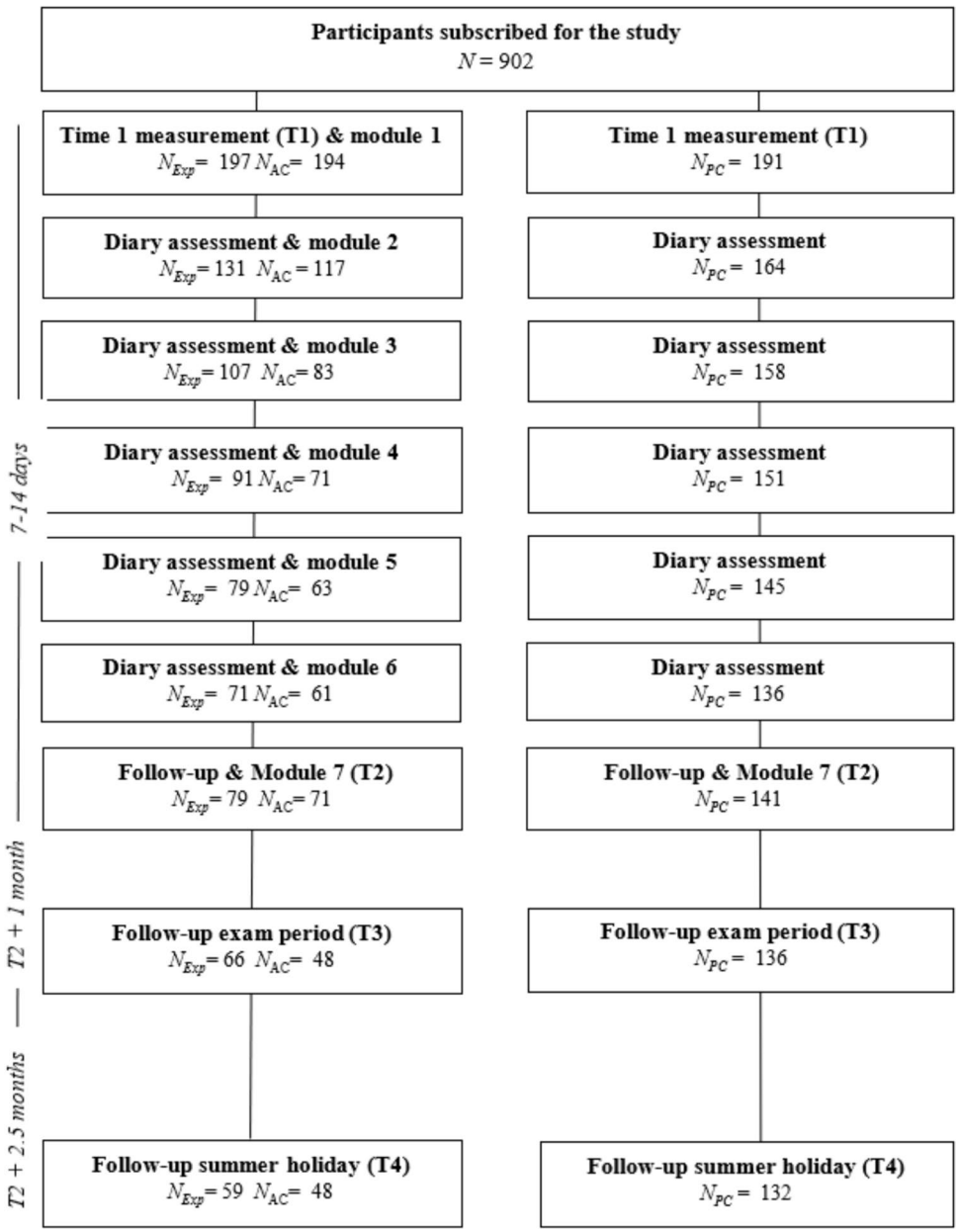

Fig. 1 Retention flow per condition and time schedule of the program

or professional counseling. A majority of students reported no or few physical complaints (64.9%). The largest group (68.8%) of participants was enrolled at a university, 25.8% at a college, and 5.4% at another educational institution. As regards employment, 41.7% of the students reported having no student job and, 46.4% and 11.9% combined their studies with, respectively, a student or a regular job.

Procedure

Table 1 shows an overview of the intervention content offered in the three conditions. The active conditions (i.e., LifeCraft and TimeCraft) comprised seven online modules to be completed within two weeks, which were presented to participants via the platform Qualtrics. To ensure that the only difference between LifeCraft and TimeCraft was the working mechanism, the format of both interventions was kept as similar as possible. At the start, participants were introduced to the targeted concept (i.e., basic psychological needs in LifeCraft and executive functioning in TimeCraft) through a student-friendly animated video. Subsequently, the modules followed an identical standardized structure. Each module focused on one basic need (LifeCraft) or one executive function (TimeCraft), and included: a challenge presented via a short video message, an exercise to brainstorm about possible activities, a video testimonial from a fellow student, and optional examples of an action plan. At the end of each module, participants formulated their

Table 1 Content Description of the Three Conditions

Condition	Instructions	Module 1	Module 2	Module 3	Module 4	Module 5	Module 6	Module 7	Booster 1+3 weeks	Booster 2+2 months
LifeCraft		Autonomy	Relatedness	Competence	Autonomy	Relatedness	Competence	Consolidation		
	Formulate an action plan to do something for this specific need	Do something you really feel like doing	Make connection to someone you like	Do something you are good at	Do something you find meaningful	Ask help or help someone else	Learn something	Looking back	Own obstacles, strategies, tips and something to remember	Letter to self & picked quotes
TimeCraft		Working memory	Impulse control	Cognitive flexibility	Working memory	Impulse control	Cognitive flexibility	Consolidation		
	Formulate an action plan to apply this exercise within an activity you were planning to do anyway	Strengthen your focus by memorization	Recognise and avoid outside distractions	Change a tiny habit	From working memory to long term memory	Recognise and avoid distracting impulses	Be open for unforeseen events	Looking back	Own obstacles, strategies, tips and something to remember	Letter to self & picked quotes
Passive	Think back to a random activity you did yesterday between…	10–11 am	8–9 pm	12–1 pm	7–8 pm	4–5 pm	2–3 pm			

own action plan by answering short questions based on the implementation literature (i.e., '*what*', '*when*', '*where*', '*with whom*', '*potential obstacle*', '*strategy to tackle obstacle*'; Gollwitzer, 1999; Seo et al., 2018). The seventh and final module consisted of a series of consolidation exercises designed to help participants integrate the trained skills into their daily lives. To reinforce engagement, the input from this consolidation module was also sent to participants several weeks later.

Whereas participants in the LifeCraft condition were asked to proactively plan a new activity, those in the active control condition were instructed to apply the challenge within an already scheduled activity. To illustrate, TimeCraft participants were asked to activate their working memory (Module 1) while doing something they planned to do anyway, such as grocery shopping. Participants in the passive control group also received seven e-mails in which they reflected about a random activity they had done the day before. They were not encouraged to do anything, nor were they given information about well-being. In this way, LifeCraft was tested more conservatively than in previous studies, in which participants either reported nothing about daily activities (Laporte et al., 2024) or passively waited before starting LifeCraft (van den Bogaard, Soenens, Brenning et al., 2024).

All participants who completed the baseline assessment were included in the analyses, consistent with an intention-to-treat approach. Little's (2021) test for data missing completely at random (MCAR), conducted on the study variables across all four time points and the background variables, indicated that data were missing at random. The normed chi-square (χ^2/df) was 1.20, which falls below the threshold of 2 (Bollen, 1989). As a result, Full Information Maximum Likelihood (FIML; Schafer & Graham, 2002) was used to handle missing data. To check robustness of the findings, additional analyses were conducted with completers-only (completers of T1-T2, T1-T2-T3 and T1-T2-T3-T4; see Table 1 in supplementary material). These analyses yielded no substantial differences from the intention-to-treat analyses; therefore only intention-to-treat findings are reported.

Measurements

Participants completed the same battery of questionnaires at all time points, with the exception of demographic variables and the moderator (i.e., need desire), which were assessed only at Time 1. The stem 'During the previous week…' was used for all outcome variables at all measurement points. Table 2 presents Cronbach's alphas, means, and standard

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

	Means $T1_{Pre}$			Means $T2_{post}$			Means $T3_{Exams}$			Means $T4_{Holiday}$			Internal Consistencies			
	$LC_{N=197}$	$TC_{N=194}$	$PC_{N=191}$	$LC_{N=79}$	$TC_{N=71}$	$PC_{N=141}$	$LC_{N=66}$	$TC_{N=48}$	$PC_{N=136}$	$LC_{N=59}$	$TC_{N=48}$	$PC_{N=132}$	α_{T1}	α_{T2}	α_{T3}	α_{T4}
Need crafting	4.70(0.96)	4.76(1.00)	4.72(0.96)	4.95(1.05)	5.07(0.96)	4.74(0.94)	4.75(0.90)	4.56(1.01)	4.60(0.99)	5.20(1.02)	5.36(0.89)	5.13(0.94)	.89	.91	.90	.92
Need satisfaction	3.41(0.66)	3.42(0.63)	3.42(0.60)	3.57(0.72)	3.62(0.55)	3.39(0.61)	3.32(0.71)	3.36(0.74)	3.26(0.61)	3.63(0.77)	3.86(0.55)	3.68(0.62)	.77	.84	.79	.86
Need frustration	2.94(0.74)	2.91(0.81)	2.84(0.73)	2.63(0.78)	2.65(0.66)	2.79(0.75)	2.76(0.71)	2.74(0.75)	2.96(0.67)	2.48(0.88)	2.16(0.67)	2.42(0.78)	.78	.81	.77	.85
Well-being	2.78(0.87)	2.80(0.83)	2.70(0.85)	3.04(0.90)	2.96(0.84)	2.85(0.85)	2.85(0.95)	2.77(0.86)	2.71(0.85)	3.19(0.99)	3.39(0.91)	3.20(0.90)	.89	.89	.91	.94
Ill-being	1.32(0.61)	1.31(0.59)	1.28(0.59)	1.18(0.65)	1.18(0.56)	1.19(0.58)	1.13(0.66)	1.19(0.68)	1.25(0.64)	0.97(0.71)	0.83(0.50)	0.95(0.61)	.91	.92	.92	.94

LC LifeCraft condition, *TC* TimeCraft (active control) condition, *PC* Passive control condition

deviations of the variables across all time points for each condition.

Need crafting

A shortened 12-item version of the Need Crafting Scale (NCS; Laporte et al., 2021a, 2021b) was used, retaining the items with the highest factor loadings. Four items were included for each psychological need, two of which assessed awareness (e.g. '*last week it was clear to me which people love me, and which people I love*' for relatedness awareness), and two of which assessed action ('*last week I tried to do things as much as possible that I really wanted to do rather than things that had to be done*' for autonomy action). This shortened version has been successfully used in previous research (Laporte et al., 2021a, 2021b), demonstrating similar correlations with the outcome variables as the original full scale. Items were rated on a 7-point Likert scale ranging from 1 (*completely not true*) to 7 (*completely true*). In the present study, the NCS showed an average reliability of α = 0.91, range across measurements = 0.89-0.92.

Satisfaction and frustration of the basic needs

Need-based experiences were measured with 12-items taken from the Basic Psychological Need Satisfaction Need Frustration-scale (BPNSNF; Chen et al., 2015). Earlier research provided evidence for the internal and predictive validity of this shortened version (Heissel et al., 2018; Mabbe et al., 2018). Psychological need frustration (e.g. "*last week, most things I did felt like "I had to",* for autonomy frustration) and need satisfaction (e.g. "*Last week, I felt confident that I can do things well",* for competence satisfaction) were both captured by two items per need (six items per scale). Items ranged from 1 (*completely not true*) to 5 (*completely true*) on a 5-point Likert scale. Need satisfaction showed an average reliability of α = 0.82 (range = 0.77–0.86), and need frustration showed an average reliability of α = 0.81 (range = 0.77–0.85).

Well-being

Two indicators of well-being were measured. Participants filled out the five items of the Satisfaction with Life Scale (SWLS; Diener et al., 1985; "*Last week I was satisfied with my life*") ranging from 1 (*completely not agree*) to 5 (*completely agree*). In addition, they rated three items (e.g., "*Last week I felt energetic*") of the Vitality scale from the Subjective Vitality Measurement (SVM; Brenning et al., 2019; Ryan & Frederick, 1997) on a 4-point Likert scale ranging from 1 (*seldom or never*) to 4 (*most of the time or constantly*). As in prior research (Laporte et al., 2024; van

den Bogaard, Soenens, Brenning et al., 2024), a composite score was calculated by averaging the standardized scores of both indicators. This composite demonstrated an average reliability of α = 0.91 (range = 0.89-0.94).

Ill-being

Two indicators of ill-being were measured. Participants filled out the 7-item stress subscale from the short-version of the Depression Anxiety and Stress Scale (DASS; Lovibond & Lovibond, 1995; Van Der Kaap-Deeder et al., 2019; e.g., "*Last week it was hard for me to relax*") and the 12-item version of the Centre for Epidemiological studies Depression Scale (CES-D; Radloff, 1977; e.g., "*Last week I felt depressed*"). All items were scored on a 4-point Likert scale ranging from 0 (*seldom or never*) to 3 (*most of the time or constantly*). A composite score was calculated by averaging the standardized scores of both indicators as input for the primary analyses. Both the DASS (Coker et al., 2018) and the CES-D (Park & Yu, 2021) are well-validated instruments used in previous LifeCraft interventions (Laporte et al., 2024; van den Bogaard, Soenens, Brenning et al., 2024). In this study ill-being showed an average reliability of α = 0.92, range = 0.91–0.94.

Need desire

The Desire for Need Satisfaction Scale (Sheldon & Gunz, 2009) assesses participants' wish to get each of their basic needs (autonomy, relatedness and competence) met. Three items were used per need (e.g., *'You manage to create a life style where others no longer pressure you, and you feel free to do what you really want to do'*), which were rated on a 5-point Likert scale, ranging from 1 (*no desire for this change*) to 5 (*much desire for this change*). Due to a technical error, one item of the competence scale was missing. The reliability of this 8-item measure was satisfactory (α = 0.76).

Program engagement

In every module participants in the experimental and active control condition indicated to what extent they executed their action plan before the new challenge started. This question was rated on a 5-point Likert scale ranging from 1 ("*completely not executed"*) to 5 (*"completely executed"*). Responses 4 ("*almost completely executed"*) and 5 ("*completely executed*") were interpreted as indicating sufficient engagement with a given module and were therefore recoded as 1. Responses 1 to 3 were recoded as 0, reflecting low engagement. These dichotomous scores were summed cross modules to calculate a total program engagement score, ranging from 0 to 6. Participants were classified as highly engaged (coded as 1) if they obtained a score of 4 or higher, and as lowly engaged (coded as 0) if they scored 3 or lower. This operationalization is consistent with previous LifeCraft studies (Laporte et al., 2024; van den Bogaard, Soenens, Brenning et al., 2024), enabling direct comparison across studies.

Plan of analysis

Latent change models (LCMs) were estimated in MPlus 8.7 (Muthén & Muthén, 2017) using Full Information Maximum Likelihood (FIML) to test the hypotheses. LCMs enable the estimation of both between- person and within-person variance across four time points (i.e., pre-training, post-training, exam and holiday period), using latent variables for intercepts (between-person: level) and slope (within person: change over time) (Howardson et al., 2017). Model fit was evaluated using a combination of the Root Mean Square Error of Approximation (RMSEA), the Standardized Root Mean Square Residual (SRMR), and the Comparative Fit Index (CFI). An RMSEA value below 0.08, an SRMR value below 0.06, and a CFI of 0.90 or higher are considered indicative of acceptable model fit (Hu & Bentler, 1999; Kline, 2005).

Measurement invariance

Before estimating the latent change models to test our hypotheses, we examined measurement invariance of the key constructs by assessing whether factor loadings on their respective latent variables remained consistent across time points (i.e., metric invariance). To this end, constrained and unconstrained measurement models were compared based on the Difference in Comparative Fit Index (DCFI; Little, 2021) and significance of the $\Delta\chi^2$ (Reise et al., 1993). A DCFI smaller than 0.01 (Cheung & Rensvold, 2002) and a non-significant $\Delta\chi^2$ indicate that the constructs retain the same meaning over time. Consistent with the internal consistency approach (Kishton & Widaman, 1994), we used subscales of the observed variables as indicators of their corresponding latent factors. Specifically, the latent factor for need crafting, need desire, need satisfaction and need frustration were indicated by respective subscales for autonomy, competence, and relatedness. The latent factor for well-being was represented by scores for life satisfaction and vitality, whereas depressive symptoms and stress served as indicators of ill-being. Because need desire was assessed only once (at baseline), it was not included in the measurement invariance analyses.

Second, after establishing metric invariance, we estimated univariate LCMs for all study variables. Each model included a latent level factor and three latent change factors

representing changes from T1 to T2, T2 to T3, and T3 to T4. For each univariate LCM, we checked whether the level and change parameters exhibited sufficient variance to justify proceeding with hypothesis testing.

Program effectiveness

To test the effectiveness of LifeCraft relative to the other conditions and across time (Hypothesis 1, 2 & 3), we created two dummy variables. The first dummy variable contrasted the LifeCraft condition with the active control condition (*'Active'*), and the second contrasted the LifeCraft condition with the passive control condition (*'Passive'*). LifeCraft condition was coded as 1, while the control conditions were coded as 0, such that positive effects of the dummy variables reflected beneficial effects of LifeCraft. Both contrasts were included as predictors in the LCMs, predicting both the level and change of each study variable.

To examine whether need crafting functioned as the working mechanism (Hypothesis 1), we estimated a sequential model in which condition assignment predicting changes in need crafting, which in turn predicted changes in need-based experiences (i.e., need satisfaction and need frustration. These changes in need-based experiences subsequently predicted changes in well-being and ill-being. A stepwise approach was followed to test whether additional direct effects within this mediational model were significant. Specifically, direct effects from condition assignment to need-based experiences or well-being/ill-being, and from need crafting to well-being/ill-being. If these paths neither improved model fit nor reached statistical significance, they were excluded from the final model. In the final step, we estimated indirect paths: (1) from condition assignment, via change in need crafting, to change in outcome variables (i.e., need-based experiences, well-being and ill-being); and (2) from change in need crafting, via change in need-based experiences, to change in well-being and ill-being.

Moderation

Another series of LCMs was conducted to examine the moderating role of program engagement (Hypothesis 4). We created two dummy variables: the first contrasted highly engaged LifeCraft participants with the passive control group ("high"), and the second contrasted lowly engaged LifeCraft participants with the passive control group ("low"). Participants in the passive control group received a score of 0 on both dummy variables, while those in the contrasted groups were coded as 1. In this way, the passive control group served as the reference group for comparing both highly and lowly engaged engaged LifeCraft participants. Non-significant effects indicate that the level of change in the outcome variables did not differ from the passive control group. As a supplementary analysis, the same approach was applied to the TimeCraft condition (see supplementary material Table 2). Finally, a last series of univariate LCMs was conducted to investigate whether need desire moderated the effectiveness of LifeCraft relative to the passive control condition. The total need desire score was mean-centered prior to inclusion in the models. An interaction term was constructed by multiplying condition with need desire. Condition, need desire, and the interaction term were entered as predictors of the latent level and change variables in the LCMs.

Results

Preliminary analyses

Background characteristics

In a first step, we performed a MANOVA/MANCOVA with gender, age, type of education, employment status, physical complaints, and psychological help as independent variables to predict the study variables at baseline (i.e., need crafting, need satisfaction, need frustration, well-being and ill-being) as dependent variables. A multivariate effect was found for physical complaints (Wilks' $\lambda = 0.96$, F (5, 532) = 4.84, $p < 0.001$) and psychological help (Wilks' $\lambda = 0.91$, F (10, 1064) = 5.04, $p < 0.001$), but not for gender (Wilks' $\lambda = 0.97$, F (10, 1064) = 1.48, $p = 0.14$), age (Wilks' $\lambda = 0.99$, F (5, 532) = 1.49, $p = 0.19$), type of education (Wilks' $\lambda = 0.97$, F (20, 1765) = 0.93, $p = 0.54$) and employment (Wilks' $\lambda = 0.99$, F (10, 1064) = 0.71, $p = 0.72$).

Subsequent univariate tests revealed that physical complaints were negatively associated with need crafting (b = − 0.12; F (1, 547) = 7.93; $p < 0.001$), need satisfaction (b = -0.07; F(1, 547) = 7.79; $p < 0.001$) and well-being (b = -0.16; F (1, 547) = 21.05; $p < 0.001$), and positively associated with need frustration (b = 0.12; F(1, 547) = 14.05; $p < 0.001$) and ill-being (b = 0.14; F(1, 547) = 31.62; $p < 0.001$). Receiving psychological counselling, or intending to seek it, was negatively associated with need crafting (b = – 0.50, F(2, 546) = 9.49, p < 0.001), need satisfaction (b = –0.35, F(2, 546) = 8.75, p < 0.001), and well-being (b = – 0.52, F(2, 546) = 16.08, p < 0.001), and positively associated with need frustration (b = 0.53, F(2, 546) = 14.25, p < 0.001) and ill-being (b = 0.47, F(2, 546) = 26.03, p < 0.001). Consequently, all primary analyses were controlled for psychological help and physical complaints.

Randomization check

We conducted a MANOVA to examine baseline differences between the three conditions, with condition as fixed factor and the study variables at baseline and the continuous background characteristics (i.e., age and physical complaints) as dependent variables. The overall multivariate effect of condition was non-significant (Wilks' $\lambda = 0.97$, $F(14, 1080) = 1.12$, $p = 0.34$). Next, chi-square tests provided evidence for non-significant associations between condition and gender ($c^2(2) = 0.43$, $p = 0.81$), employment status (c^2 (4) = 0.95 $p = 0.92$), receipt of psychological help (c^2 (4) = 3.15 $p = 0.53$), and type of education (c^2 (4) = 1.22, $p = 0.87$). Overall, these non-significant associations indicate that participants were randomly assigned across the three conditions and no baseline differences in study variables or demographic variables are observed between conditions.

Dropout analyses

A series of logistic regression analyses examined whether participants' study dropout rates varied as a function of condition assignment, sociodemographic differences, and baseline variables, with dropout at T2 through T4 serving as binary outcomes. Participant were considered as dropped out when they did not complete the questionnaires at that specific time point (i.e., study dropout), although some of these participants may still have participated in the exercises at that time point.

Condition significantly predicted dropout at T2 (c^2 (2) = 65.64, $p < 0.001$), with participants in the passive control condition dropping out less frequently than those in the experimental and active control conditions. Similar effects of condition were obtained for dropout at T3 (c^2 (2) = 56.84, $p < 0.001$) and T4 (c^2 (2) = 62.41, $p < 0.001$). In a second step, background variables and baseline differences were added to predict dropout at different time points. Type of education predicted dropout at T2 ([OR] = 0.58 (CI − 0.91, − 0.20), $p < 0.01$), T3 ([OR] = 0.67 (CI − 0.77, − 0.05), $p < 0.05$) and T4 ([OR] = 0.60 (CI − 0.89, − 0.13), $p < 0.01$), with university, relative to college students, dropping out less often. Age predicted dropout at T3 ([OR] = 0.96 (CI − 0.08, − 0.00), $p < 0.05$) and T4 ([OR] = 0.96 (CI − 0.08, − 0.00), $p < 0.05$), with older participants being less likely to drop out. Having a student job also predicted a higher likelihood of dropping out at T3 ([OR] = 1.61 (CI 0.07, 0.88), $p < 0.01$) and T4 ([OR] = 1.81 (CI 0.19, 0.91), $p < 0.01$). Additionally, a significant effect of need frustration was observed at T3 ([OR] = 1.61 (CI 0.05, 0.92), $p < 0.05$) and T4 ([OR] = 1.79 (CI 0.14, 1.03), $p < 0.05$), with participants reporting higher need frustration at baseline being more likely to drop out. Finally, need satisfaction also predicted an increased likelihood to drop out at T4 ([OR] = 2.01 (CI 0.10, 1.31), $p < 0.05$).

Correlations

As shown in Table 3, intra-class correlations (ICC) indicated sufficient variance at both the between-person and within-person level to justify the use of Latent Change Models (LCM; above 0.05; Preacher et al., 2010; Woehr et al., 2015). As a result, correlations between study variables could be calculated at both levels. These correlations were generally consistent with theoretical expectations. Need crafting correlated positively with need satisfaction and well-being, and negatively with need frustration and ill-being across all measurement points. In contrast, need desire correlated negatively with need crafting, need satisfaction, and well-being, and positively with need frustration and ill-being across the measurement points.

Coding action plans

To better understand the working mechanism of the intervention conditions, two independent coders blindly rated 120 randomly selected action plans (10 action plans by 6 modules by 2 conditions) after a brief training session. The coding procedure consisted of four coding units. In the first two coding units, coders indicated to what extent each action plan targeted individuals' overall basic psychological needs and overall executive functioning. In the second 2 coding units, coders rated to what extent each action plan targeted each of the three separate needs (autonomy, competence, relatedness) and each of the three executive functions (working memory, impulse control, cognitive flexibility) on

Table 3 Descriptive Statistics, ICC, and Correlations between Variables at the Between- and Within- Person Level

	M	SD	ICC	1	2	3	4	5
1. Need crafting	4.82	0.99	0.58		.80***	− .65***	.67***	− .59***
2. Need satisfaction	3.46	0.65	0.50	.67***		− .74***	.71***	− .65***
3. Need frustration	2.76	0.77	0.53	− .62***	− .72***		-.65***	.75***
4. Well-being	2.88	0.89	0.61	.59***	.61***	-.63***		− .73***
5. Ill-being	1.20	0.62	0.60	− .55***	− .59***	.61***	− .69***	
6. Need desire	3.69	0.76	1.00	− .33***	− .40***	.43***	− .43***	.43***

Correlations at the within- and between-person level are found below and above the diagonal

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

a 3-point Likert scale ranged as "Not targeted" (1), "Somewhat targeted" (2), and "Clearly targeted"(3).

Coding results showed sufficient inter-rater reliability (Landis & Koch, 1977), with kappa values ranging from 0.57 and 0.60, except for one lower value (0.23) for overall basic psychological needs. In the next step frequency scores of 2 ("*Somewhat targeted*") and 3 ("*Clearly targeted*") were summed for each individual rater and then averaged across both raters. A chi-square test indicated that a significant larger proportion of action plans in the LifeCraft, compared to the TimeCraft condition, were rated as targeting individuals' basic psychological needs (97% vs. 79%; χ^2 (1) = 7.08, $p < 0.01$). In contrast, a greater proportion of action plans in the TimeCraft, compared to the **LifeCraft** condition, were rated as targeting individuals' overall executive functioning (90% vs. 17%; χ^2 (1) = 61.91, $p < 0.001$). The relatively modest difference in the overall focus on basic needs between both conditions prompted a more detailed comparison of need-specific ratings. Autonomy (χ^2 (1) = 9.38, $p < 0.01$; 49.2% vs. 20.8%) and relatedness (χ^2 (1) = 32.19, $p < 0.001$; 60% vs. 8.3%) were more frequently targeted in the LifeCraft condition, while the effect for competence went in the opposite direction (χ^2 (1) = 14.06, $p < 0.01$; 29% vs. 65%), favouring the active control condition.

Primary analyses

The overall measurement model showed an adequate fit (CFI = 0.89; RMSEA = 0.05; SRMR = 0.07). A comparison between the constrained measurement model (in which the factor loadings of the indicators were set equal across all measurement points) and an unconstrained model (in which all factor loadings were freely estimated) revealed a ΔCFI of 0.000 and a non-significant chi-square difference ($\Delta\chi^2(30) = 35.01$, $p = 0.24$). Thus, the measurement model was found to be longitudinally invariant, and each of the indicators loaded satisfactorily on its respective latent factor, justifying the use of the constrained model in subsequent analyses. In the next step, a series of univariate LCMs indicated that both level and change parameters for all measured constructs were significant (see Table 4), suggesting that there were meaningful individual differences in baseline scores as well as in the degree of intra-individual change over time.

Program effectiveness

Table 5 and Fig. 2 present the results (including unique R^2's) of the LCMs examining the effects of the LifeCraft intervention to both the active and passive control condition. All results were controlled for psychological counseling and physical complaints; however, analyses without these control variables yielded the same pattern of findings. As predicted in Hypothesis 1, students in the LifeCraft condition, relative to those in the passive control group, reported increased need crafting and need satisfaction and decreased need frustration from T1 to T2. However, no significant changes in well-being nor ill-being were observed. When comparing the LifeCraft condition to the active control group, no significant differences were found in the outcome variables from T1 to T2.

Next, a serial mediation model tested the explanatory role of need crafting. As shown in Fig. 3, a fully mediated model provided the best fit with the data (RMSEA = 0.06, CFI = 0.90, SRMR = 0.06). The change in need crafting from T1 to T2, induced by the experimental condition, predicted parallel changes in need satisfaction and need frustration. In turn, these changes in need-based experiences were positively associated with changes in well-being and ill-being, respectively. No direct effects were found from changes in need crafting to changes in well-being or ill-being. However, the indirect effect from condition to change in well-being, via changes in need crafting and need satisfaction, was significant (b = 0.14, SE = 0.057, $p < 0.05$), as was the indirect effect on ill-being via changes in need crafting and need frustration (b = 0.11, SE = 0.041, $p < 0.01$).

A third series of analysis examined whether the observed benefits of LifeCraft were maintained during a stressful exam period (Hypothesis 2). None of the effects of the contrast between LifeCraft and the passive control group in the prediction of change between T2 and T3 were significant, suggesting that the initial gains of LifeCraft persisted during the exam period. These findings should be interpreted in light of a general time-related decrease in need crafting and

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

	Level		Change $T1_{Pre}$-$T2_{Post}$		Change $T2_{Post}$ -$T3_{Exams}$		Change $T3_{Exams}$ -$T4_{Holiday}$		Fit Indices		
	M	s^2	*M*	s^2	*M*	s^2	*M*	s^2	RMSEA	CFI	SRMR
Need crafting	4.79***	.76***	.10*	.32***	− .17**	.50***	.53***	.64***	.03	.98	.07
Need satisfaction	3.34***	.25***	.05	.14***	− .12**	.15***	.35***	.23***	.06	.93	.10
Need frustration	2.99***	.41***	-.12**	.18***	.09	.21***	-.44***	.41***	.06	.93	.08
Well-being	2.86***	.63***	.17***	.20***	− .07	.40***	.34***	.59***	.02	1.00	.03
Ill-being	1.26***	.25***	-.07***	.06***	− .03	.25***	− .21***	.21***	.06	.99	.03

RMSEA Root mean square error of approximation; *CFI* Comparative fit index; *SRMR* Standardized root mean square residual;
***$p < .001$, **$p < .01$, *$p < .05$

Table 5 Univariate Latent Change Models of Program Effects (Active and Passive Condition Contrasted with LifeCraft Condition)

	Change $T1_{Pre}$-$T2_{Post}$			Change $T2_{Post}$ -$T3_{Exams}$		Change $T3_{Exams}$ -$T4_{Holiday}$		Fit Indices			Effect-size
	Level	Active	Passive	Active	Passive	Active	Passive	RMSEA	CFI	SRMR	Unique R^2
	β(SE)	*β*(SE)	*β*(SE)	*β*(SE)	*β*(SE)	*β*(SE)	*β*(SE)				
Need crafting	− .27(.083)**	.03(.103)	.20(.083)*	.09(.103)	− .04(.096)	− .21(.106)*	− .13(.089)	.03	.98	.06	.08
Need satisfaction	− .31(.106)**	− .06(.108)	.20(.089)*	− .03(.133)	− .10(.105)	− .23(.121)	− .17(.098)	.05	.92	.08	.10
Need frustration	− .28(.095)**	− .07(.109)	− .21(.089)*	.13(.132)	.04(.101)	.25(.119)*	.23(.089)*	.05	.92	.07	.07
Well-being	− .36(.073)***	.06(.088)	.13(.079)	− .08(.100)	− .08(.083)	− .18(.100)	− .09(.087)	.01	1.00	.02	.05
Ill-being	− .11(.105)	.09(.102)	-.09(.084)	.02(.090)	− .00(.077)	.17(.098)	.12(.084)	.01	1.00	.02	.02

Unique R2=((β Passive)/ β passive+β control variables))*R2 Change Pre-to-Post; *RMSEA* Root mean square error of approximation; *CFI* Comparative

fit index; *SRMR* Standardized root mean square residual; Estimate (β) and SE are standardized values, p values are unstandardized

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

need satisfaction across conditions between T2 and T3, as shown in Table 4.

Another contextual effect was observed as participants moved from a stressful exam period (T3) towards summer holiday period (T4). As predicted in Hypothesis 3, participants' overall functioning improved considerably, with higher levels of need crafting, need satisfaction, and well-being, and lower levels of need frustration and ill-being at T4 compared to T3. Condition assignment moderated some of these average effects. As shown in Table 5, participants in both control groups demonstrated a stronger increase in need crafting and a larger decrease in need frustration between T3 and T4 compared to participants in the experimental group. In other words, the gains observed during the exam period among LifeCraft participants diminished during the summer holiday, as participants in the control groups caught up from the lower scores reported at T3. This was confirmed by a post-hoc Tukey test, which showed no significant differences between the three conditions in need crafting and need frustration at T4.

Moderation

To examine whether program engagement moderates the effectiveness of the program (Hypothesis 4), a highly and lowly engaged group of participants in the experimental group are contrasted with the passive control group. As can be seen in Table 6, effects for the highly engaged group are largely similar to those reported for the entire group. Specifically, highly engaged participants reported a stronger increase in need crafting and a more pronounced decrease in need frustration compared to those in the control condition, whereas these benefits were not observed among lowly engaged participants. The program gains remained stable from T2 to T3, with highly engaged participants displaying an additional decrease in ill-being in comparison with the control condition. Finally, similar to the 'catching up' pattern above, control group participants reported a stronger increase in well-being and steeper decrease in ill-being and need frustration when transitioning from the exam to the holiday period. Table 2 in supplementary material shows a similar effect of program engagement for TimeCraft participants.

Need desire

The main effects reported in Table 7 (and Fig. 1 in supplementary material) indicate that participants with a stronger need desire reported lower levels of need crafting, need satisfaction and well-being and higher levels of need frustration and ill-being across the entire time span. However, out of the 15 possible interactions between need desire and condition (i.e., passive versus experimental group), only one reached significance. Specifically, during the transition from T2 to T3, participants with higher need desire showed a greater decline in well-being compared to those with lower need desire. This lack of significant interactions suggests that LifeCraft was generally effective regardless of participants' overall level of need desire. Given the possibility that moderation might occur at the level of specific needs, the same set of analyses was repeated for the three facets of need desire. Neither autonomy desire nor relatedness desire moderated the intervention effects. However, four significant interactions were observed for competence desire from T2 to T3. Specifically, the initial benefits of the intervention observed from T1 to T2 disappeared at T3 for participants

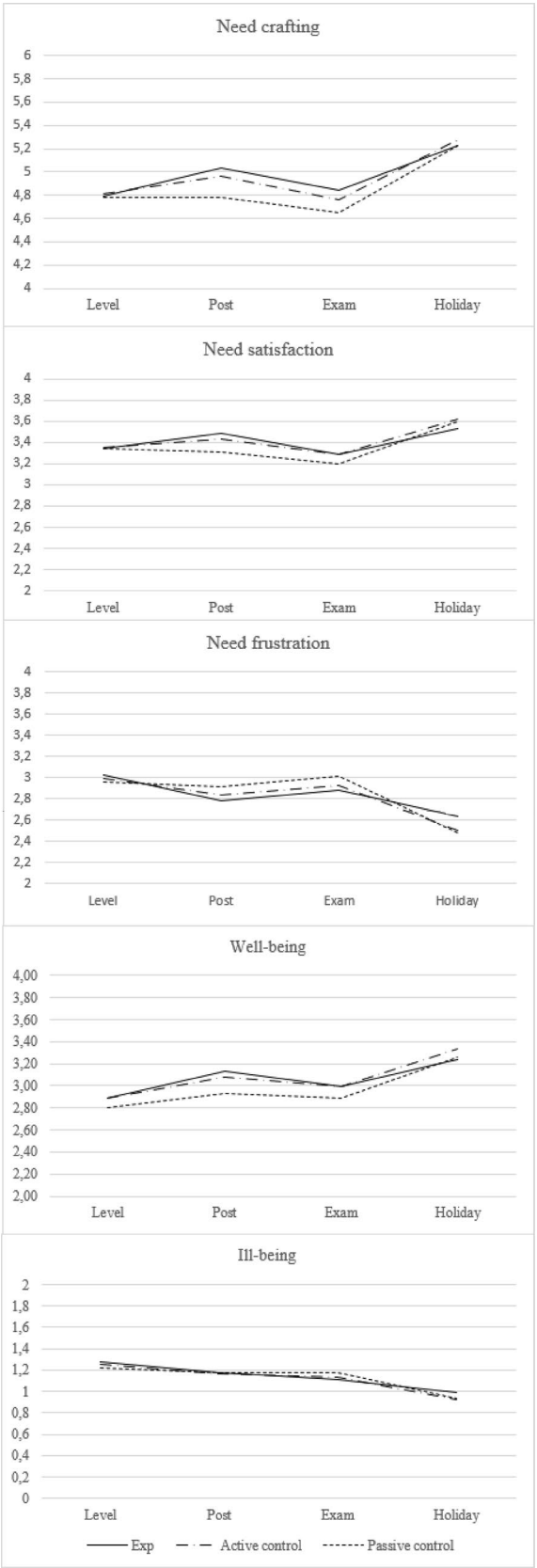

Fig. 2 Univariate latent change models

high in competence desire: they showed a decline in competence crafting, competence satisfaction, and well-being, as well as an increase in competence frustration from T2 to T3. A final interaction was found for competence satisfaction from T3 to T4, again reflecting a "catching-up" effect, whereby participants in the passive control group and LifeCraft participants high in competence desire showed improvement from the exam period to the summer holiday. In conclusion, need desire played a minimal role as a moderator. Nonetheless, the few interactions found for competence desire may be meaningful, as they emerged during a time when students' sense of competence was likely under pressure—namely, during the stressful exam period.

Discussion

Self-Determination theory (SDT) provides a strong, empirically based framework for health promotion and prevention (Ryan & Vansteenkiste, 2023). Central in SDT are the basic psychological needs for autonomy, relatedness and competence, that serve as a catalysts of well-being and resources of resilience (Ryan, 2023; Vansteenkiste & Ryan, 2013). While the social context plays a critical role in supporting individuals' basic needs, the skill to craft one's own need satisfactions (Laporte et al., 2021a, 2021b) remains an underexplored, yet promising pathway for intervention. The present study extends prior work on need crafting by examining whether a brief, online training yields incremental benefits compared to both a passive and active control group, across both distressing (exams) and relaxing (holidays) periods. To better understand individual differences in program effectiveness, we also examined program engagement and individuals' desire—that is, the strength of their desire to have their basic needs met—as potential personal moderators of intervention effects.

Promoting need crafting

Program effectiveness

In line with previous research (Laporte et al., 2024; van den Bogaard, Soenens, Brenning et al., 2024), participants in the LifeCraft condition reported higher need crafting, higher need satisfaction and lower need frustration directly after completing the intervention. However, in contrast to earlier findings among students (van den Bogaard, Soenens, Brenning et al., 2024), no direct effects of the intervention were observed on well-being and ill-being. Instead, changes in well-being and ill-being were only observed indirectly, through changes in need satisfaction and need frustration,

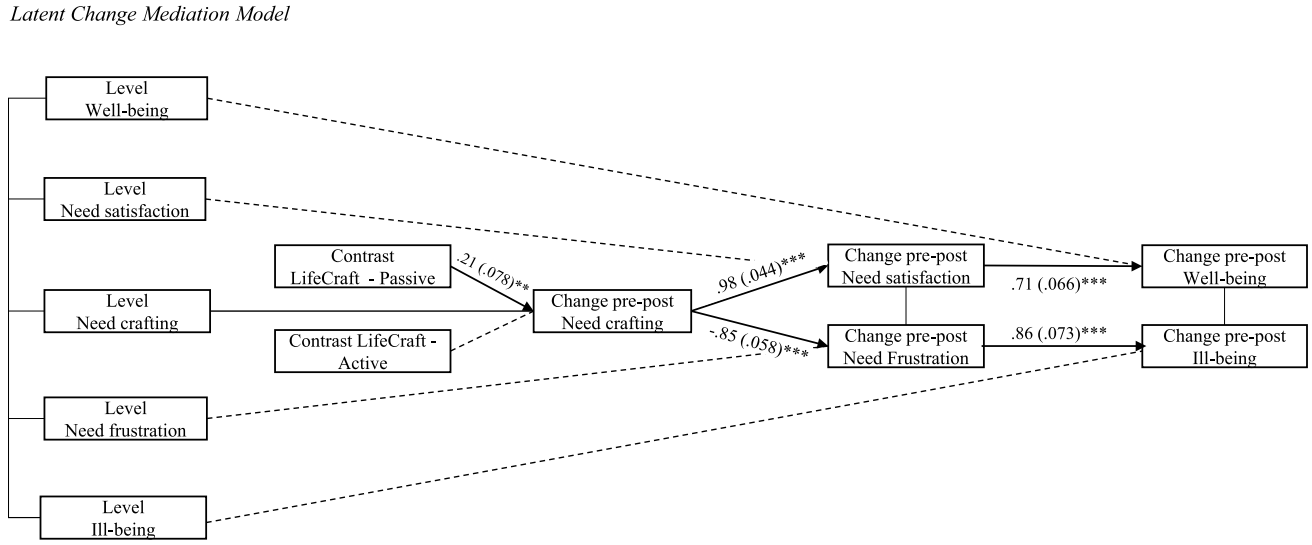

Fig. 3 Latent change mediation model

Table 6 Latent Change Models with Engagement as Moderator (LifeCraft vs. Passive Control)

	Level		Change $T1_{Pre}$-$T2_{Post}$		Change $T2_{Post}$- $T3_{Exams}$		Change $T3_{Exam}$—$T4_{Holiday}$		Fit Indices		
	High	Low	High	Low	High	Low	High	Low	RMSEA	CFI	SRMR
	β(SE)	*β*(SE)	*β*(SE)	*β*(SE)	*β*(SE)	*β*(SE)	*β*(SE)	*β*(SE)			
Need crafting	.09(.052)	.02(.059)	.14(.071)*	.19(.121)	.02(.067)	− .08(.128)	− .11(.068)	− .09(.113)	.04	.97	.07
Need satisfaction	.11(.059)	− .04(.066)	.13(.082)	.21(.133)	− .04(.074)	− .13(.145)	− .14(.078)	− .12(.122)	.06	.91	.10
Need frustration	− .06(.064)	.10(.062)	− .20(.093)*	-.16(.127)	.03(.077)	.01(.143)	.17(.082)*	.22(.109)*	.06	.92	.07
Well-being	.12(.061)	.01(.061)	.11(.064)	.11(.115)	.05(.068)	− .16(.105)	− .21(.078)**	.02(.100)	.02	1.00	.03
Ill-being	− .05(.056)	.09(.056)	− .08(.075)	− .05(.120)	− .10(.076)*	.04(.100)	.22(.078)**	.01(.097)	.02	1.00	.02

RMSEA Root mean square error of approximation; *CFI* Comparative fit index; *SRMR* Standardized root mean square residual; Estimate (β) and SE are standardized values, p values are unstandardized

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

respectively. These changes in need based-experiences, in turn, were fully driven by changes in need crafting.

Hence, although increased need crafting does not directly improve well-being, the intervention's working mechanism -namely, that need crafting promotes need satisfaction, which in turn promotes well-being- is supported. Prior work (Laporte et al., 2024; van den Bogaard, Soenens, Brenning et al., 2024) provides similar evidence for the explanatory role of need crafting to account for the intervention effects. The difference in effectiveness of the current intervention, compared to previous ones, may be attributed to the less stressful training circumstances in the current study. In earlier LifeCraft studies, participants' well-being was more acutely challenged—either by the COVID-19 crisis (Laporte et al., 2024) or by academic exams (Van den Bogaard, Soenens, Brenning et al., 2024). Under such challenging circumstances, the LifeCraft intervention may have more opportunity to exert a direct beneficial effect on well-being. This aligns with a broader pattern in positive psychology research: interventions tend to be more effective among individuals who are most at risk for mental health problems (Bolier et al., 2013).

The absence of a direct effect of the LifeCraft intervention on well-being suggests that mental health benefits only emerge to the extent that the intervention leads to increased need satisfaction and/or lower need frustration. This observation raises new questions about factors that influence the effectiveness of need crafting attempts. One factor may be the nature of individuals' need crafting attempts. Ideally, need crafting attempts emanate from individuals' personal interests, preferences, and goals (Thomaes et al., 2017). However, rather than engaging in such authentic need crafting activities, some people may select need crafting activities more on social expectations, focusing on what they believe they *should* do to experience autonomy, relatedness or competence according to others or societal norms. Such pseudo need crafting does not stem from a genuine awareness of one's psychological needs and is therefore less

Table 7 Latent Change Models with Need desire as Moderator (LifeCraft vs. Passive Control)

Need Desire													
	Level	Change $T1_{Pre}$-$T2_{Post}$			Change $T2_{Post}$-$T3_{Exams}$			Change $T3_{Exam}$-$T4_{Holiday}$			Fit Indices		
	ND	Con	ND	ND*Con	Con	ND	ND*Con	Con	ND	ND*Con	RMSEA	CFI	SRMR
	β(SE)	*β*(SE)	*β*(SE)	*β*(SE)	*β*(SE)	*β*(SE)	*β*(SE)	*β*(SE)	*β*(SE)	*β*(SE)			
Need Crafting	− .42(.09)***	.23(.09)*	− .12(.10)	.06(.13)	− .03(.10)	.10(.11)	− .18(.12)	− .15(.09)	− .02(.12)	.17(.12)	.05	.96	.07
Need Satisfaction	− .60(.08)***	.21(10)*	.15(.16)	− .10(.15)	− .10(.11)	− .00(.15)	− .92(.13)	− .17(.10)	.01(.15)	.14(.12)	.06	.91	.09
Need Frustration	.65(.07)***	− .28(.11)**	.01(.16)	.02(.13)	.06(.11)	− .13(.16)	.21(.13)	.24(.09)*	.04(.14)	− .14(.12)	.06	.91	.07
Well-Being	− .51(.08)***	.16(.08)	− .19(.10)	.03(.12)	− .07(.08)	.23(.09)*	− .33(.10)**	− .11(.09)	− .18(.10)	.16(.09)	.02	1.00	.03
Ill-Being	.54(.07)***	− .10(.10)	− .07(.14)	.08(.13)	− .03(.09)	− .02(.12)	.06(.10)	.14(.09)	.02(.11)	− .04(.11)	.03	1.00	.03
Competence Desire													
	Level	Change $T1_{Pre}$-$T2_{Post}$			Change $T2_{Post}$-$T3_{Exams}$			Change $T3_{Exam}$-$T4_{Holiday}$			Fit Indices		
	Competence desire	Con	CD	CD*Con	Con	CD	CD*Con	Con	CD	CD*Con	RMSEA	CFI	SRMR
	β(SE)	*β*(SE)	*β*(SE)	*β*(SE)	*β*(SE)	*β*(SE)	*β*(SE)	*β*(SE)	β(SE)	*β*(SE)			
Competence Crafting	− .19(.09)*	.25(.08)**	− .14(.08)	.14(.11)	− .01(.10)	.10(.10)	− .25(.12)*	− .14(.09)	.06(.09)	.17(.11)	.03	.98	.05
Competence Satisfaction	− .21(.08)*	.13(.09)	− .01(.10)	− .26(.12)	− .05(.09)	.07(.10)	− .26(.12)*	− .12(.09)	− .01(.09)	.24(.10)*	.00	1.00	.03
Competence Frustration	.38(.09)***	− .23(.09)*	.17(.13)	− .09(.12)	.06(.09)	− .14(.11)	.30(.11)**	.17(.09)	− .02(.13)	− .21(.13)	.02	.99	.03
Well-being	− .23(.09)*	.15(.09)	− .14(.09)	− .02(.11)	− .08(.09)	.22(.08)**	− .24(.10)*	− .12(.10)	− .03(.09)	.08(.10)	.02	1.00	.03
Ill-being	.27(.09)*	− .10(.10)	− .08(.14)	.13(.14)	− .02(.09)	− .09(.10)	.07(.11)	.13(.09)	− .07(.10)	− .03(.10)	.03	1.00	.03

Condition contains only the passive control and the experimental condition; *RMSEA* Root mean square error of approximation; *CFI* Comparative fit index; *SRMR* Standardized root mean square residual; Estimate (β) and SE are standardized values, p values are unstandardized; *ND* Need Desire, *Con* Condition, *CD* Competence Desire

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

likely to translate into need satisfaction. Personal dispositions may affect the quality of need crafting people engage in. For example, individuals with a more autonomous causality orientation (Deci & Ryan, 1985) tend to base their actions on personal interests and intrinsic goals, and are thus more likely to engage in authentic need crafting. In contrast, those with a more controlled causality orientation may be driven by a desire for social approval or by external demands, making their need crafting efforts less effective. Additionally, mindfulness may enhance the effectiveness of need crafting. By fostering greater awareness of one's internal experiences, mindfulness can help individuals more accurately identify what activities are truly need-satisfying, thereby increasing the likelihood that their crafting efforts will be beneficial.

Another factor playing a role is the degree to which important others in individuals' social context respond to the need crafting attempts. When need crafting activities occur in a generally autonomy-supportive social context, individuals' pro-active functioning and sense of initiative is likely to be welcomed and even encouraged (Cheon et al., 2020; Reeve, 2013). In contrast, in more controlling contexts, attempts to engage in need crafting may be criticized or blocked. To enhance the effectiveness of LifeCraft, future research could examine the potential role of these factors and consider ways to integrate them in the intervention. For instance, this could involve incorporating mindfulness exercises or communication guidelines to help individuals attune their need crafting attempts to the social context.

With regard to Hypothesis 1, the findings partly confirmed previous studies by replicating the short-term effects of LifeCraft on need-based functioning. The findings related to Hypothesis 2, however, extend previous intervention research by demonstrating that the benefits of LifeCraft can be sustained during a stressful period one month later. Although a general decrease in need crafting and need satisfaction was observed in the transition to the exam period, students who completed the LifeCraft training were better able to maintain their levels of need crafting and satisfaction during these more demanding times. During the holiday period, the benefits of LifeCraft faded out, as predicted in Hypothesis 3. From the exam period to the holiday period, a clear time effect emerged across all outcomes, with participants reporting improved need crafting, more positive need-based experiences, and higher levels of well-being. Presumably, during these more relaxing times, individuals engage in need crafting more spontaneously, without requiring the structured support provided by LifeCraft (Verma et al., 2017).

In sum, these findings indicate that LifeCraft has its greatest value when it is needed most (i.e., during stressful exams). At the same time, the effects of LifeCraft do not extend to more relaxing periods in life (i.e., holiday period). Further research is needed to investigate whether program benefits re-emerge when students are exposed to a new stressor, such as transition from holiday to the beginning of a new academic year.

More research is needed to determine when the training is best delivered to achieve lasting benefits. Integrating new skills in one's functioning is harder under conditions of stress due to impaired memory functions (Schwabe & Wolf, 2010), limited cognitive flexibility, and reduced integrative functioning (Packard & Knowlton, 2002; Shohamy & Wagner, 2008). As such, the holiday period might be a better timing to train need crafting. On the other hand, the current findings show that need crafting peaks during holidays, potentially making it less appealing to train something that is already "going well". To address this question, future research would (ideally) train need crafting under different circumstances: a relaxing period, a normal period and a stressful period.

Different inroads to facilitate need crafting

The current study adopted a conservative test of the LifeCraft training by comparing its effectiveness with an active control condition. The active control condition 'TimeCraft', was structured in exactly the same way as LifeCraft, including similar components like a challenge, testimonial, brainstorm exercises, and an action plan. The key difference was that TimeCraft participants focused on enhancing their executive functions throughout the program and were asked to apply each challenge to a routine activity (e.g., studying for a course or doing grocery shopping).

Unexpectedly, both active conditions yielded similar benefits in terms of need crafting and need-based functioning. A more pessimistic interpretation of these findings is that the improved well-being outcomes in both conditions was caused by common factors, placebo, or demand effects (Grünbaum, 1986). Yet, a more optimistic interpretation is that TimeCraft also promoted need crafting and need satisfaction, even though they were not explicitly targeted. This interpretation suggests that there may be multiple pathways to facilitate need crafting. Support for this view comes from the coding of participants' action plans. Although the TimeCraft plans more frequently targeted executive functioning, they also addressed basic psychological needs, with a particular emphasis on competence. Upon reflection, this finding seems plausible: participants in the TimeCraft condition likely engaged in competence-related activities, as improvements in executive functioning have been shown to foster greater self-efficacy and goal attainment (Cushman et al., 2022). From this more optimistic viewpoint, it is interesting to note that two different interventions lead to similar

outcomes, giving thought to new research directions in this area.

A first avenue for further research is to better understand the importance of awareness of the basic needs, a crucial component of need crafting. As TimeCraft did not foster higher awareness of the basic needs, but nevertheless fostered greater need-congruent action (albeit unintentionally), this raises the question whether enhancing awareness is a necessary condition. Future research could directly compare three intervention formats: an awareness-only condition, an action-only condition, and a full need crafting condition involving both components. Such a design would allow for a more precise understanding of the added and potentially synergistic value of combining awareness with action.

A second direction for future research is whether the effectiveness of LifeCraft depends on the type of stressors participants face. In the present study, both interventions yielded similar benefits, despite the observation that LifeCraft targeted all three basic needs and TimeCraft largely targeted competence. Possibly, the TimeCraft intervention matched students' need to enhance competence crafting well as they were moving towards an exam period. Future work could examine whether participants benefit more from tailored need crafting interventions that focus on the specific need most threatened in a given context, rather than from more general interventions.

Factors influencing program effectiveness

Another aim of the present study was to examine factors that may influenced individual differences in program effectiveness. Two findings deserve being highlighted. First, highly engaged participants reaped the greatest benefits of the LifeCraft training, confirming Hypothesis 4. This is evidenced by increased need crafting and decreased need frustration directly after the training and a steeper decrease in ill-being from the end of the program to the exam period. These findings are consistent with prior studies among adults (Laporte et al., 2024) and college students (van den Bogaard, Soenens, Brenning et al., 2024).

Second, regarding the role of need desire, participants with higher levels of need desire reported a less favourable pattern of outcomes over time. They engaged in less need crafting, experienced lower need satisfaction and well-being, and reported higher need frustration and ill-being. Given the shortage in their need satisfaction (Sheldon & Gunz, 2009; Van Assche et al., 2018), an important question was whether these participants would benefit less, more or equally from LifeCraft. We observed little systematic evidence for a moderating role of need desire, neither at an aggregated nor at a need-specific level, with one exception. The benefits from LifeCraft were maintained less among students high in competence desire during the exams, reflected by steeper drops from T2 (post) to T3 (exams) in competence crafting, competence satisfaction and well-being, and sharper increases in competence frustration. Possibly the evaluative nature of exams threatened students' skills and competencies (Zohar, 1998), making students with high levels of competence desire more susceptible to experience frustration (Moller et al., 2010) and a decline in intrinsic motivation (Vasconcellos et al., 2020). Students high in competence desire may require more tailored and intensive support to maintain the gained intervention benefits when confronted with a stressful period. One possible adaptation would be the inclusion of active booster sessions during the exams. Despite this exception, the overall moderating effect of need desire was limited, indicating that students benefited from LifeCraft regardless of their level of need desire. This warrants some optimism because even more vulnerable students seem to benefit from a need crafting training.

Limitations

While the current study adds valuable new knowledge to this nascent research line on need crafting, there are several limitations to acknowledge. First, a direct measure of executive functioning as an outcome variable was not included and coding action plans on 'overall basic psychological needs' had a poor inter-rater reliability. These shortcomings call for caution in interpreting the related results. Inclusion of a direct measure of executive functioning could address the question whether LifeCraft exclusively targets basic needs or also yields a secondary effect on improved executive functioning. As implementation skills are also practiced in LifeCraft (i.e., planning skills; Carlson et al., 2004), the overlap between both conditions may appear even larger, helping to explain their parallel effects. Qualitative research (e.g., focus groups), other informants (such as peer or partner reports), and different outcome variables (e.g., positive and negative affect) could also help to understand the impact of both interventions.

Second, the substantial dropout rates in the active control (63.4%) and experimental condition (59.9%) at post measurement are a serious concern, and limit the generalizability of the current findings. Several modifications could be considered to enhance retention. For instance, a shorter intervention that delivers the content over fewer modules and days may reduce dropout. However, reducing the program length could also limit its potential for sustainable change. Thus, an important challenge for future research lies in finding an optimal balance between intervention duration and the depth and quality of the content.

As earlier research pointed out that high autonomous motivation to start LifeCraft predicts less dropout (van den Bogaard, Soenens, Brenning et al., 2024), motivation is another venue to explore. Future versions of the program could include a preparatory module that fosters motivational awareness, enabling participants to make a more informed and self-endorsed decision to begin the training (see Vandereycken & Vansteenkiste, 2009). Implementation of LifeCraft in the curriculum of students would be another way to prevent dropout, as a meta-analysis of online interventions showed a vast difference in dropout between home implemented (70% dropout) and school implemented (2% dropout) interventions (Clarke et al., 2015). Yet, before LifeCraft becomes part of a well-being policy in schools, more work is needed to understand the optimal circumstances to introduce LifeCraft, and to better identify who benefits from the program, who does not, and who might even experience adverse effects.

Lastly, the current findings suggest that the active control condition unintentionally encouraged need crafting. Future research could therefore include more restrictive instructions in the active control condition to minimize the facilitation of need crafting.

Conclusion

The present study provides preliminary evidence that an online training can help students better craft their basic psychological needs, thereby increasing need satisfaction and associated well-being, particularly among highly engaged participants. The benefits of the program were generally sustained during a stressful exam period one month after the intervention, but tended to fade during the summer holiday. Overall, higher levels of need desire did not affect program benefits. Only students with high competence desire did not maintain their gains in competence crafting during the exam period. The active control condition yielded comparable effects, suggesting that there may be multiple effective pathways to facilitate need crafting and promote well-being. More research is needed to identify different ways to train need crafting, to examine the circumstances under which the program yields its greatest benefits, and who benefit most from a need crafting training.

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Declarations

Conflict of interest All of the authors declare that they have no conflict of interest.

Ethical approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed consent Informed consent was obtained from all individual participants included in the study.

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