RESEARCH PAPER

Development and Evaluation of a Prospective Group Coaching Program: Increasing Well-Being and Openness to the Future in a Subclinical Sample

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Abstract

Prospection is the ability to think about the future in order to guide behavior and gain desirable outcomes. Although theoretical research on the topic exists, there is a lack of practical application. We developed and evaluated a prospective coaching program in a subclinical sample with limited subjective well-being. Twenty-nine participants ($M_{age} = 40.6$ years, $SD = 13.6$; range 19–62 years) participated in three 3-h sessions of a prospective coaching intervention. In a between- and within-subject design, participants completed preintervention, postintervention, and follow-up questionnaires. We compared the effects to those in a waitlist control group with no intervention ($n = 37$). Linear mixed models revealed improvements in the primary variables subjective well-being and openness to the future. We also found effects in the secondary outcomes hopelessness, subjective stress, depression, positive affect, and optimism in the experimental group, but not in the waiting list control group. This pilot study, to our knowledge, is the first to prove the effectiveness of a prospective group coaching program on relevant outcomes in a subclinical sample. Further studies, for instance, with a larger sample, are needed to gain more insight on the effects of prospection in mental health promotion.

Keywords Group coaching · Prospection · Subclinical sample · Well-being

1 Introduction

In both research and practice, psychology has until this day primarily focused on the present and past while mostly disregarding the future (Seligman et al., 2016, p. XI). This is exemplified in the paradigm of behaviorism, in which teleological facts such as the expectations of future situations that do not yet exist are seen as being located in a so-called black box and thus not accessible or worth investigating (Seligman et al., 2013). Psychodynamic

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theory and therapy, although strongly focused on what happens inside the patient's black box, also focus on the past, with special attention to childhood, as this is thought to be the origin of the patient's actual disorders. It is very unfortunate that research, especially applied research, and theory have neglected how individuals think about their future. This article examines whether future orientation or prospection in the context of mental health coaching increases well-being and reduces negative affect.

Mental health coaching, a widely accessible method for maintaining or restoring a client's health, has been found to improve well-being (e.g., Denneson et al., 2019; Greif, 2017). It is perceived as less stigmatizing and is less often associated with psychopathology than, for example, psychotherapy (Mönkeberg, 2019). Moreover, this intervention is inherently oriented toward the future and toward problem solving (Grant, 2003).

Just as retrospection represents the ability to relive the past mentally, prospection, as defined by the pioneers of its investigation, Gilbert and Wilson (Gilbert, 2006; Gilbert & Wilson, 2007), is "our ability to *pre-experience* the future by simulating it in our minds" (Gilbert & Wilson, 2007, p. 1352). The term "pragmatic prospection" refers to a specific aspect of this pre-experiencing, the use of prospection to steer real-life behavior in desired directions (Baumeister et al., 2016). For this purpose, people mentally construct different possibilities of their future and align their actions to achieve the desired and to avoid the undesired future (Seligman et al., 2016, p. 159). Thus, pragmatic prospection is less about pre-experiencing and predicting what will happen in the future and more about preparing for actions in specific situations by mentally anticipating different possible scenarios (Baumeister et al., 2018).

Prospection plays a specific role in depression (Roepke & Seligman, 2016). Maladaptive and misunderstood if–then scenarios are likely to be particularly present in depressed individuals, in which "if clauses" are completed with negative "then clauses" (e.g., "If I make a mistake, my boss will think I am incompetent"; Roepke & Seligman, 2016). Indeed, anticipated negative future events have been found to be significantly correlated with depressive symptoms and hopelessness (Andersson et al., 2013). Moreover, studies have shown that depression is associated with reduced positive future thinking (cf. MacLeod, 2017, p. 36). Referring to Beck's (1976) cognitive triad of depression, Roepke and Seligman (2016) suggested that negative prospection may represent the core element of Beck's triad from which depression arises.

Previous future-focused group interventions have reinforced well-being by training aspects of goal-based thinking and behavior (MacLeod, 2017, pp. 235–237). As a first approach, Vilhauer et al. (2013) and Vilhauer (2014) developed the so-called future-directed therapy (FDT) for the treatment of depression. FDT focuses on reducing hopelessness and on teaching participants how to cultivate positive expectations of the future. FDT was applied in a structured program of 20 group sessions, each lasting 90 min, over a 10-week period. Compared to cognitive behavioral therapy, FDT showed in between group analyses a significantly stronger reduction in depressive symptoms ($d = 0.82$; $N = 42$) and reported hopelessness ($d = -1.21$) and a significantly greater increase in positive future expectations ($d = 0.63$). As a second treatment, Van Beek et al. (2009) developed a future-oriented group training specifically tailored to suicidal patients. This training was applied in ten 90-min sessions over a period of 10 weeks. In a within-group design, patients showed a moderate reduction in depressive symptoms ($d = 0.47$; $N = 76$) and suicidality ($d = 0.46$) after treatment. These changes remained stable at a 1-year follow-up with small effect sizes of $d = 0.33$ and $d = 0.37$, respectively (Tarrier et al., 2008; Van Beek, 2013). Finally, Cheavens et al. (2006) examined the efficacy of a future-related program known as hope therapy in a nonclinical sample. This eight-session treatment,

each session lasting for 2 h, includes psychoeducation and the teaching of hopeful thinking and increased goal striving. Compared with a waitlist control group, the treatment group showed a moderate to large decrease in depression ($d = 0.70$; $N = 39$) and anxiety symptoms ($d = 1.20$), as well as a moderate to large increase in hope ($d = 0.69$), meaning in life ($d = 0.90$), and self-esteem ($d = 0.83$).

Closely following the programs just described, we developed and conducted a fully manualized group coaching program in the present pilot study. Based on the concept of (positive) prospection described by Seligman et al. (2016) and MacLeod (2017), this prospective coaching program aims at helping people simulate their future more positively and thus reduce negative feelings and symptoms and promote well-being and quality of life. Starting from the conception of "pragmatic prospection" (Baumeister et al., 2016), we integrated the WOOP (wish, outcome, obstacle, plan) process model by Oettingen (1996) and the pragmatic prospection model by Szpunar et al. (2014), which form the basis of our manual.

1.1 Pragmatic Prospection

Baumeister et al. (2016) divided pragmatic prospection into two phases: the optimistic phase, representing *future-directed imaginings*, and the realistic phase, representing concrete *goals* and *plans*.

1.2 The WOOP Process Model

Following an action theoretical approach (Heckhausen et al., 2008), the WOOP model represents the central stages of preparing and conducting goal-directed behavior (Oettingen, 1996). At the same time, the model is fully compatible with the pragmatic prospection model: Initially, desires and wishes are generated by free (future-directed) imagination, followed by anticipating and defining a realistic outcome. Obstacles that might stand in the way of achieving the goal are then anticipated and ways of overcoming them are worked out, which is then formulated into a concrete action plan (Oettingen, 1996). The processes described in the WOOP model enable one to actively envision and move toward one's future by gaining insight into one's desires and aspirations and aligning one's behavior to fulfill those desires. In many contexts, such as health, performance, and interpersonal relationships, the usefulness of this model has been confirmed (Krott et al., 2019).

1.3 Taxonomy of Prospection

Adding detail and extending the pragmatic prospection and WOOP models, the taxonomy of prospection model distinguishes four components or steps of future-related thinking: *simulation*, *prediction*, *intention*, and *planning* (Szpunar et al., 2014). In simulating, mental representations of the future are generated; in predicting, probability estimates are given; in intending, goals are set; and in planning, individual steps to reach those goals are formulated.

In our project, we combined the three models mentioned above and identified two processes that are addressed in all three: desire-forming imaginings on the one hand and the formation of goals and plans on the other. These two processes consequently represent the

basis of our prospective coaching approach: In the first step, clients work on becoming fluent and competent in imagining new desirable opportunities in their future, in order to formulate achievable goals and plans to reach them in the second step.

1.4 Desire-Forming Imaginings

A key component of our prospective coaching model, and a major difference from other approaches such as FDT, is our focus on discovering new opportunities through desire-forming imaginings (Baumeister et al., 2016). In this first stage, characterized by its open and creative nature, new or alternative future scenarios are developed, and access to one's own desires and wishes is established. Positive feelings in the here-and-now are particularly beneficial because ideas that are more favorable emerge when one's mood is positive rather than negative (Fredrickson, 2000; Hepburn et al., 2006). An example of an intervention in this phase is the so-called best possible self exercise by King (2001). In this intervention, participants are asked to actively imagine a desired future self. To relate the idea of desire-forming imaginings to the models referred to above, this first step includes future-directed imaginings (pragmatic prospection) and wish formulation (the WOOP process model) as well as simulations and predictions of the future (the taxonomy of prospection process model).

1.5 Goals and Plans

Generating new desirable future scenarios is not enough to successfully reach goals and promote well-being (Oettingen & Reininger, 2016). In the second phase of our prospective coaching approach, goals are identified and plans to reach them are formulated. This stage, accordingly, includes planning the necessary steps to achieve one's goals while taking into account obstacles and barriers (Oettingen, 1996). One important method in this second phase is mental contrasting, which involves comparing the desired future with the current reality and consequently thinking about how to achieve that desired future (Oettingen & Reininger, 2016). Prospection can assist in developing goals as well as motivating for change (MacLeod, 2017, p. 174). As in the process models outlined above, this second phase includes components of pragmatic prospection (goal and plan), three elements of the WOOP model (outcome, obstacle, and plan), and the taxonomy of prospection model (intention and planning).

Our two-step prospective coaching approach is not only theoretically sound, but it is also supported by empirical results: With respect to the first process (desire-forming imaginings) it has been found that imagining a desired future self is closely related to well-being (MacLeod, 2016). Specifically, several studies have found that the best possible self intervention (King, 2001) results in more positive affect, increased optimism, and higher satisfaction with life (King, 2001; Meevissen et al., 2011; Peters et al., 2010; Renner et al., 2014).

Regarding goal setting and planning, studies have found that there is a moderate to close relationship between goal setting, goal striving, and well-being (Schmuck & Sheldon, 2001). Studies have also demonstrated that pursuing goals (by following plans) enhances well-being as well as positive thoughts about the future (Quoidbach et al., 2009; Sheldon, 2001).

A key component in achieving desired outcomes is self-efficacy, which strongly affects planning (Luszczynska & Schwarzer, 2003) as well as persisting in accomplishing tasks (Deci & Ryan, 2000; Manavipour & Saeedian, 2016), indicating that people high in self-efficacy are more likely to plan competently and invest more energy in following their plans. At the same time, concrete planning makes future behavior more effective and efficient, as the future becomes more predictable (Seligman et al., 2016, p. 169). Studies have also found that the number of planning steps and the effectiveness of the plans are closely related to individuals' subjective well-being, through, among other things, setting their focus on concrete goals and tasks in the goal-achievement process (MacLeod & Conway, 2005; Segal et al., 2018).

Additionally, thoughts of specific positive future events and a high vividness in imagining one's own future have been found to increase optimism (MacLeod, 2017, p. 51). And finally, training planning skills in patients with mental disorders, such as depression, improved life satisfaction and reduced self-reported hopelessness and distress (Farquharson & MacLeod, 2014; Ferguson et al., 2009).

1.6 The Present Study

In our pilot study, we designed and evaluated a prospective short-term mental health coaching intervention basing on our two-step prospective coaching approach in a group setting. As prospection has been found to be impaired in people with subclinical symptoms of depression (Hu et al., 2018; Yang et al., 2018), we selected a subclinical sample to test our hypotheses. The aim of our prospective coaching approach is to help individuals simulate their future in a more positive way and to focus on positive personal goals rather than on symptom relief to improve well-being and mental health. As several studies found that health-related coaching may be effective even with a relatively small number of sessions (Theeboom et al., 2014), we decided on a short-term program.

In addition to examining the effectiveness of the coaching intervention, we were also interested in detecting paths in mediating the effects. Thus, we also conducted mediation analyses with two mediators selected from empirical findings, hopelessness and self-efficacy. In the case of hopelessness, several authors found a strong negative relationship between hopelessness and openness to the future or future thinking on the one hand (Botella et al., 2018; Breier-Williford & Bramlett, 1995; MacLeod et al., 2005) and between hopelessness and well-being on the other (Buzzai et al., 2020). Moreover, we selected hopelessness as a mediator because hopelessness is inherently future oriented and thus important in light of the theory of our intervention. Considering the work of Roepke and Seligman (2016), who have postulated a very close relationship between hopelessness and prospection, we hypothesized that prospection should improve when hopelessness decreases (cf. Roepke & Seligman, 2016).

Concerning self-efficacy, researchers found that this variable is associated with more future-related thinking (Brown et al., 2012, 2016; Nan & Qin, 2019) and that it is a predictor of well-being at the same time (Bandura, 2010; Strobel et al., 2011). Additionally, it is directly addressed in our prospective coaching program because various options for action and perspectives are elaborated. Therefore, we expected that the increase of self-efficacy during the coaching process would improve well-being and openness to the future at its end. Moreover, the idea of self-efficacy being a mediator is supported by Bandura's

social-cognitive theory (Bandura, 2004). This theory posits that self-efficacy supports the formulation of goals and plans and as a consequence the implementation of new behaviors. On the basis of these and the aforementioned findings, we formulated the following hypotheses.

Hypothesis 1 (addressing the short-term effectiveness of our prospective coaching program in the experimental group): In the intervention group—compared to a control group, the primary outcomes (subjective well-being, openness to the future) as well as the secondary positive outcomes (optimism, self-efficacy, positive affect, and satisfaction with life) will increase and the negative outcomes (depressed-like symptoms, negative affect, hopelessness, and subjective distress) will decrease following the intervention.

Hypothesis 2 (addressing the long-term effectiveness of the prospective coaching intervention in the experimental group): The effects postulated in Hypothesis 1 will remain stable over a 1-month follow-up period.

Hypothesis 3 (addressing the exploratory investigation of mediating effects by hopelessness and self-efficacy): Hopelessness and self-efficacy will mediate the effects between the conditions (prospective coaching intervention or no coaching intervention) and the primary outcomes of the intervention (well-being and openness to the future) such that hopelessness and self-efficacy will increase following the prospective coaching intervention, which in turn will increase well-being and openness to the future.

2 Method

2.1 Participants

Participants were recruited from Salzburg, Austria and the surrounding area through posters, flyers, newspaper articles, and social media. The target group consisted of German-speaking persons between 18 and 70 years of age and with mild to moderate impairment in well-being. Participation was voluntary and there was no financial compensation. The required sample size was determined using G*Power 3.1. software (Faul et al., 2007). Considering results of similar future-oriented intervention studies (e.g., van Beek, 2013) and meta-analytic findings of treatments for subclinical depressed subjects (Cuijpers et al., 2014), we assumed a low effect size of $f = 0.17$. Further, a power of 0.80 and an alpha level of 0.05 were assumed, revealing a required sample size of 58 persons. To allow for an anticipated 19% dropout rate (McDermut et al., 2001), a sample size of 72 participants was set as the target, 36 for each condition.

One hundred thirty-three people signed up to participate. They were invited to an online screening with an anonymous individual access code by e-mail. Those who met the participation criteria received an acceptance e-mail ($n = 83$). Of these, 13 dropped out of the study because they were unable to attend the offered appointments (Fig. 1). Another four did not fill out any questionnaire. Thus, the final sample consisted of 66 individuals, 29 in the experimental group and 37 in the waitlist control group.

2.2 Design and Procedure

The present longitudinal study followed a quasi-experimental mixed design. The independent variables were condition (prospective coaching vs. waitlist control group) and time of measurement. For the experimental group, Time 1 (T1) was preintervention, Time 2 (T2) was postintervention, and Time 3 (T3) was a follow-up 1 month after the intervention. The control group was measured at 3-week intervals.

After interested persons submitted a request to participate, they received a link to an online screening to assess eligibility. We included respondents who scored between 7 and 22 on the sum score of the German-language WHO-5 well-being index (Brähler et al., 2007). The WHO-5 was used because it has been shown to be a sensitive and specific screening instrument for depression (Topp et al., 2015). In addition, exclusion criteria were (1) simultaneous participation in psychotherapeutic or psychological treatments and (2) the presence of a diagnosed mental disorder. These exclusion criteria were chosen as we assumed that concurrent treatments could influence the coaching effects and because we wanted our target sample to be subclinical, not clinical. Furthermore, the use of psychotropic drugs as well as illicit drugs was an exclusion criterion, as these could also influence the study results (cf. Huhn et al., 2014; Lundqvist, 2005). Individuals who met the eligibility criteria were assigned to either the experimental group (prospective coaching intervention) or a waitlist control group.

Allocation to the experimental and control groups was not randomized. Participants were allocated to the experimental group until maximum capacity ($n = 36$) was reached and subsequently applying participants were allocated to the control group. This allocation strategy was chosen for technical reasons. As recruitment was more difficult than expected, we decided to use a nonrandomized design according to time of enrollment. We have to emphasize, however, that we did not find a significant difference in any measure at baseline between the experimental and the control group, and the control group measurements did not change over the time of study. Thus, it can be assumed that the lack of randomization did not result in significant spurious effects.

After the study was completed, the control group received the same coaching as the experimental group. Data from the experimental group were collected via self-report questionnaires by the online survey platform *LimeSurvey* at three time points: 1 week before coaching (T1), 1 day after the last coaching session (T2), and 4 weeks after the intervention (T3). In parallel, control group participants received the online surveys at intervals of 3 weeks. The 3-week interval was chosen to collect the three measurements of the experimental group and control group nearly simultaneously. Indeed, there was little time between the completion of the recruitment of the control group and the start of the prospective coaching intervention in the intervention group. All participants' data were subjected to data protection and stored anonymously.

Participants ranged in age from 19 to 64 years (overall: $M = 40.02$ years, $SD = 12.9$; experimental group: $M = 40.6$, $SD = 13.6$; control group: $M = 39.6$, $SD = 12.7$; $t(64) = 0.30$, $p = 0.769$). Additional demographic characteristics are give in Table 1. There were no significant differences in any variable between conditions.
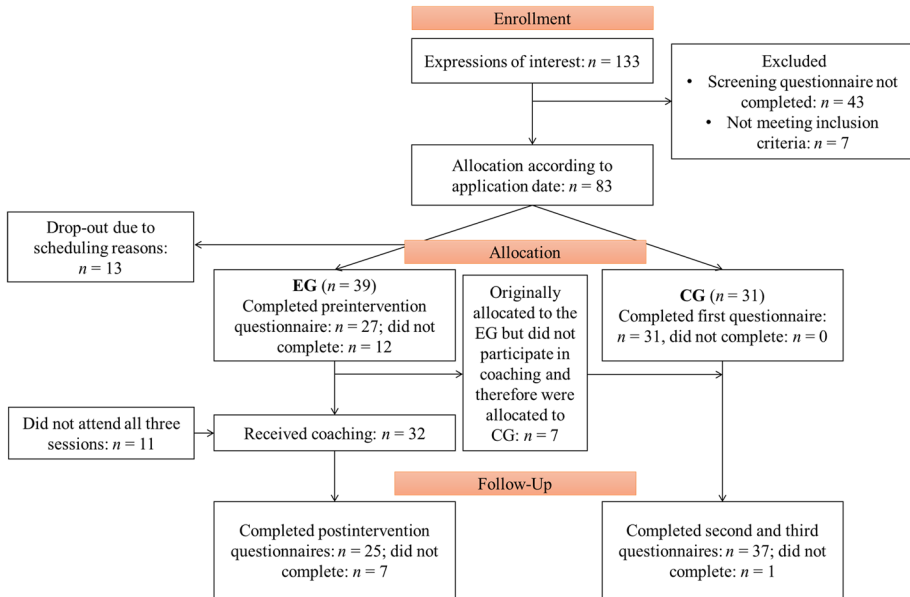
Fig. 1 Participant flow diagram for the experimental group (EG) and the waitlist control group (CG)

2.3 Prospective Coaching Intervention

As described above in more detail, the prospective coaching intervention consisted of two core interventions: (1) desire-forming imaginings and (2) the development of goals and plans. Some parts of the interventions were adopted from the literature (e.g., best possible self exercise; see King, 2001, for more details) but new exercises were devised in addition, such as an imaginative journey in which the participant focused first on the current state of goal achievement, followed by imagining a resourceful state or event and then the desired state of goal achievement (*actual–target comparison*). Psychoeducational instructions were applied to increase the participants' awareness of their own prospection ability. Practical exercises taught participants how to imagine and interpret their personal future in a positive way. A particular focus was placed on written exercises (e.g., writing about a positive future) for making a plan to reach a personal goal. It has previously been shown that writing about goals and emotional experiences is a successful method for promoting mental health (King, 2001; Pennebaker, 1997, 2010; Roepke et al., 2018). We also focused on making the exercises feasible in a group setting so that participants could engage in conversations and interact with each other, thus allowing them to reflect on their own and each other's perspectives.

The manual for the intervention stipulated three sessions each lasting 3 h, including a break of about 20 min. The coaching was fully manualized to ensure standardization. The group sessions were conducted in a dual-coach setting with 9–12 participants and with sessions spaced 1 week apart.

During the sessions, information was presented via flipcharts, and corresponding practical exercises were introduced and executed for each domain of prospection. At the end

Table 1 Demographic characteristics of the experimental and control groups

Variable	Experimental group (n=29)		Control group (n=37)		χ^2
	n	*%*	*n*	*%*	
Gender					$\chi^2(1, N=66)=0.09, p=.764$
Female	21	72	28	76	
Male	8	28	9	24	
Nationality					$\chi^2(2, N=66)=1.32, p=.516$
Austrian	20	69	29	78	
German	8	27.6	6	16	
Other	1	3	2	5	
Marital status					$\chi^2(5, N=66)=6.63, p=.250$
Single	4	14	10	27	
Living with a partner	12	41	13	35	
Married	8	27.6	6	16	
Widowed	0	0	1	3	
Divorced	3	10	7	19	
Other	2	7	0	0	
Educational level					$\chi^2(4, N=66)=1.62, p=.805$
Vocational education	1	3	1	3	
Compulsory education	8	28	11	30	
Qualification for university entrance	15	52	18	49	
University degree	4	14	7	19	
Other	1	3	0	0	

of each topic, the group reflected on transferring information into everyday life and practice. Topics were distributed according to the stages of the prospective coaching approach. At the beginning and the end of each session, a brief exercise was performed to assess personal mood. Session 1 provided an overview of the coaching program and the basics of prospection. In addition to receiving theoretical instructions, participants developed a personal wish, wrote it down, and performed an imagination exercise. Session 2 was an intensive exploration of prospection. Participants refined their wish from the first session into a goal, specified it, and developed an action plan. Topics such as values or character strengths were addressed in terms of prospection by, for example, relating them to each participant's prospection. In Session 3, the focus was on consolidating one's own prospection and transferring it to everyday life. In addition, the group elaborated individual obstacles to achieving their goals. Table 2 gives a summary of the content of each session of the prospective coaching intervention program.

2.4 Measures

The wording of the scales, which in their original form do not refer to the last 2 weeks, was adapted to the 2-week time frame to obtain change sensitivity, that is, an adequate measurement of change (Schuck, 2000). To assess reliability, DeVellis (2003) guidelines were used,

Table 2 Summary of the prospective group coaching manual content

Session	Content	Homework
1: Overview and basics of Prospection	Introduction to the coaching and clarification of the general conditions Explanation of the theory of prospection Discussion about major life decisions Elaboration of participants' own wishes and goals Exploration of current and future emotions (Berking, 2017) Execution of a guided imagination exercise (Best Possible Self adapted from Blickhan, 2018; King, 2001)	Completion of the Best Possible Self writing exercise (adapted from King, 2001) Exploration of own values (Schmidt et al., 2007)
2: Intensive engagement with participants' own prospection	Review of the theory of prospection and homework Introduction to the concept of self-efficacy Discussion about participants' own values and two-sides-of-the-same-coin exercise (based on Mruk, 2013) Application of the SMART method (Locke & Latham, 1990) Exploration of obstructive thought patterns Execution of a guided imaginative interview (a so-called journalist exercise developed for this purpose), followed by an introduction to and exercise on character strengths (Rashid & Seligman, 2018) Development of an action plan	Completion of the character strengths questionnaire (Rashid & Seligman, 2018) Writing a letter from a benevolent companion (adapted from Wehrle, 2010)
3: Refinement and transfer to everyday life	Discussion of the homework Introduction to the concept of self-compassion Discussion about the implementation of the action plan and on obstacles to goal attainment Development of one's own fixed and growth mindset (based on Dweck, 2017) Uncovering of helpful past experiences (Blickhan, 2018), including an introduction to the optimistic explanatory style Implementation of a guided imagination regarding the current and target state of goal attainment (so-called actual–target comparison, developed for this purpose) Review of and reflection on the coaching, including discussion of the participants' personal growth	

Each session was delivered to a group of 9–12 people. SMART = acronym for specific, measurable, attractive, realistic, timely

in which internal consistency with a Cronbach's alpha between 0.65 and 0.70 can be classified as acceptable, between 0.70 and 0.80 as respectable, and between 0.80 and 0.90 as very good.

2.4.1 Primary Variables

Subjective well-being. To survey subjective well-being, the German version of the WHO-5 well-being index was used (WHO-5; Brähler et al., 2007), containing five items. Various studies have shown that the scale is sufficiently valid as both a screening and an outcome measure (Topp et al., 2015). On a 6-point scale from 0 (*at no time*) to 5 (*all the time*), participants estimate the extent to which they agree with the statements. The scale value is obtained by adding up the item values. The internal consistency of the original German-language scale can be estimated as excellent with a Cronbach's alpha of 0.92 (Brähler et al., 2007). In the present sample, internal consistency was low to very good, with reliabilities of $\alpha = 0.61$ at T1, $\alpha = 0.86$ at T2, and $\alpha = 0.84$ at T3.

Openness to the future. Openness to the future has been described as an "active cognitive-affective mood state that involves positive expectations about what life may bring" (Botella et al., 2018, p. 3). To measure this construct, we used the Openness to the Future Scale (OFS; Botella et al., 2018), consisting of 10 items evaluated on a 5-point Likert scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). After recoding an inversely formulated item, the sum score was calculated. The scale has very good internal consistency with a Cronbach's alpha of 0.87 (Botella et al., 2018). Since a German-language version of the scale was not available, the scale was translated from English into German by the investigators with the help of the translation guidelines of the European Social Survey (Schnaudt et al., 2014). Specifically, two independent translations were prepared by the first two authors, which they subsequently compared and combined into one translation. Together with the last author, open questions were then discussed, and the final translation was created. In the present sample, the scale displayed very good internal consistency, with values of $\alpha = 0.85$ at T1 and T2 and $\alpha = 0.87$ at T3. Regarding psychometric characteristics, our version is comparable to the original Spanish version. A principal component analysis with oblimin rotation resulted in a unidimensional factor structure (as in the original study). Additionally, we used the same or comparable instruments as the original authors to validate the scale and found similar correlations (e.g., OFS and hopelessness: our study: $r = -0.79$, $p < 0.001$; original study: $r = -0.46$, $p < 0.001$; OFS and optimism [LOT-R[1]]: our study: $r = 0.72$, $p < 0.001$; original study: $r = 0.54$ $p < 0.001$).

2.4.2 Secondary Variables

Optimism. The construct of optimism, the general belief that one will experience good outcomes in life (Scheier & Carver, 1988), was assessed using the German version of the revised Life-Orientation Test (LOT-R; Glaesmer et al., 2008). The LOT-R, the most commonly used self-report measure of optimism (MacLeod, 2017, p. 50), assesses an individual's optimistic attitude through self-report using 10 items rated on a 5-point Likert scale ranging from 1 (*strongly agree*) to 5 (*strongly disagree*). Taking into account filler items and inversely scored items, a sum score is generated from the item values. With a Cronbach's alpha of 0.69, the internal consistency is considered acceptable (Glaesmer

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[1] See Secondary variables section for a description of the LOT-R.

et al., 2008). In the present sample, the scale displayed very good reliability with values of α = 0.82 at T1, α = 0.83 at T2, and α = 0.81 at T3.

Self-efficacy. The General Self-Efficacy Scale (SWE; Schwarzer & Jerusalem, 2003) was used to assess self-efficacy, the expectation of being able to master a certain task and achieve a certain goal by means of one's own competence (Bandura, 1977). The scale is a self-report instrument with 10 items that express and query internal and stable attributions of the expectation of success. On a 4-point scale, items are rated from 1 (*not true*) to 4 (*exactly true*), and the sum score is calculated. The internal consistencies (Cronbach's alpha) vary in the German samples between α = 0.80 and α = 0.90 and can be estimated as very good (Schwarzer & Jerusalem, 2003). The internal consistencies in the current study were also very good, with α = 0.84 at T1, α = 0.90 at T2, and α = 0.88 at T3.

Satisfaction with life. According to Diener (1984), satisfaction with life consists of an affective and a cognitive-evaluative component. The affective component is characterized by experiencing positive rather than negative feelings. The cognitive-evaluative component consists of global and domain-specific satisfaction with regard to different areas of life (e.g., job, health). Satisfaction with life was assessed using the German version of the Satisfaction with Life Scale (SWLS; Glaesmer et al., 2011). The five items are rated on a 7-point Likert scale ranging from 1 (*does not agree at all*) to 7 (*completely agree*), and the test score is obtained by summing up the individual item responses. Previous research showed that the internal consistency of the SWLS is very good with a Cronbach's alpha of 0.92 (Glaesmer et al., 2011). In the current sample, reliability was respectable at T1 (α = 0.78) and very good at T2 (α = 0.91) and T3 (α = 0.89).

Depression. Symptoms of depression were measured using the short form of the General Depression Scale (ADS-K; Hautzinger & Bailer, 2003), a German abridged version of the Centre for Epidemiologic Studies Depression Scale (Radloff, 1977). Individuals were asked to indicate the extent to which 15 statements were true or not, on a 6-point scale from 1 (*very false*) to 6 (*very true*). Reversed-score items were taken into account in the calculation and a sum score was generated using the individual responses. Hautzinger and Bailer (2003) reported an internal consistency of the ADS-K ranging from α = 0.88 to α = 0.95, which can be considered very good. In this study, the Cronbach's alpha was very good at T1 (α = 0.86), T2 (α = 0.84) and T3 (α = 0.85).

Positive and negative affect. To assess negative affect, the German version of the Scale of Positive and Negative Experience (SPANE; Rahm et al., 2017) was used. This scale measures the frequency of both positive and negative affect using 12 items. Participants rate on a 5-point scale ranging from 1 (*never/very rarely*) to 5 (*always/very often*) how often the statements are true. The internal consistencies for the Negative Affect and the Positive Affect subscales are α = 0.82 and α = 0.88, respectively, in a German sample and can therefore be classified as very good (Rahm et al., 2017). In the present study, Positive and Negative Affect showed very good reliabilities in the T1 and T2 measurements with α = 0.91 (Positive Affect) and α = 0.84 (Negative Affect), and in the T3 measurement with α = 0.92 (Positive Affect) and α = 0.87 (Negative Affect).

Hopelessness. Krampen's (1994) revised version of the Hopelessness Scale (H-RA Scale) for measuring hopelessness is a German-language adaption of Beck et al.'s (1974) Hopelessness Scale. Hopelessness has been defined as a core characteristic of depression (Beck et al., 1974). In this context, the H-RA Scale measures "altered evaluations of action and/or life goals in addition to reduced expectations of competence and contingency" (Krampen, 1994, p. 5). The scale is a self-report instrument with 10 items that are assessed

on a 6-point scale from 1 (*very wrong*) to 6 (*very right*). After reversing inversely formulated items, the sum score was calculated. With a Cronbach's alpha of 0.79, the internal consistency is respectable (Krampen, 1994). In the present sample, internal consistency was respectable at T1 ($\alpha=0.79$), T2 ($\alpha=0.75$) and T3 ($\alpha=0.77$).

Subjective distress. Becker et al. (2004) developed the Trier Inventory of Chronic Stress (TICS), which measures the extent of subjectively perceived distress. A screening version of this scale (TICS-SCSS) was used in the current study, with 12 items rated on a 5-point scale ranging from 0 (*never*) to 4 (*very often*). This scale surveys different facets of chronic distress, such as not being able to control worrisome thoughts, and it provides a global measure of experienced distress. To obtain the test score, the individual item scores were summed up. The internal consistency of the scale is considered very good with a Cronbach's alpha between 0.84 and 0.91. In the current study, internal consistency was very good, with $\alpha=0.85$ at T1, $\alpha=0.89$ at T2, and $\alpha=0.91$ at T3.

3 Data Analysis

The statistical analysis was performed using SPSS version 25 (IBM Corp., 2019), and the software R version 4.0.4 (R Core Team, 2021), and the alpha error level was set at 5%. Participants in the experimental group were valid if they had attended at least one session and thus 3 h of coaching. As a result, we did not exclude any data, and there were no large outliers that we would have had to remove. The Shapiro–Wilk test was applied to test the normal distribution of the scales. Differences in demographic data and baseline measures of the experimental and control groups were examined using chi-square tests and independent-sample *t* tests. No imputation method was used to replace missing data. The main analyses presented in this study were conducted using mixed-effects models with crossed random effects for participants, using the package lme4 (version 1.1.26) in R. The fixed effects of condition (experimental group, control group) and time of measurement (T1, T2, T3) were coded as factors. We included random intercepts to account for the by-participant dependencies in the repeated time measurements, thus estimating how individual participants differed in the primary and secondary variables. We used the Akaike information criterion to compare models. We visually inspected residual plots (via the plot_model function in the sjPlot package in R) to determine whether there were any obvious deviations from normality or homoscedasticity. All models were fitted using restricted maximum likelihood estimation. The *p* values listed were obtained using likelihood ratio tests of the full model with the interaction effect Group×Time of Measurement against the model without this interaction effect (see Appendices A and B). The corresponding effect sizes (*d*) were interpreted according to Cohen (1988), with $d=0.20$ as a small effect, $d=0.50$ as a medium effect, and $d=0.80$ as a large effect. Moreover, post hoc tests with Bonferroni correction were calculated to examine pairwise differences between measurement points (for control group and experimental group separately). As a final step, the PROCESS macro by Hayes (2013) was used to conduct mediation analyses, and 5,000 bootstrapping samples and bias-corrected 95% confidence intervals (CIs) were used to assess their significance. The mediation analyses were based on completers for Models 1 and 2 (well-being as outcome) with $n=52$ and for Models 3 and 4 (openness to the future as outcome) with $n=54$.

4 Results

Statistical assumptions were tested prior to data analysis. The Shapiro–Wilk tests indicated that the T1 measures of the experimental group for the OFS and H-RA Scale were not normally distributed. In all other measures the Shapiro–Wilk test was not significant and therefore a normal distribution can be assumed. Moreover, there were no significant differences in any baseline measure between the experimental and control groups (see Appendix C). Table 3 shows the descriptive results. Compared with the control group, the experimental group showed improvements in well-being, openness to the future, optimism, and satisfaction with life, and a reduction in depression, hopelessness, and subjective distress.

All statistical assumptions for linear mixed models were met, as residual errors and random effects for all variables were found to be normally distributed. The results of the linear mixed models for the primary and secondary variables are reported below; for details regarding the model-building process and the full models, see Appendix A. Thereafter, the results of the mediation analyses are presented.

Table 3 Means and standard errors for dependent variables

Dependent variable	Condition	Time 1 M (SE)	Time 2 M (SE)	Time 3 M (SE)
Well-being (WHO-5)	EG	13.5 (0.68)	17.1 (0.73)	17.4 (0.74)
	CG	14.5 (0.61)	13.5 (0.72)	15.3 (0.70)
Openness to the future (OFS)	EG	36.4 (1.19)	40.4 (1.21)	38.2 (1.23)
	CG	37.8 (1.07)	38.3 (1.08)	38.0 (1.06)
Optimism (LOT-R)	EG	21.0 (0.83)	23.2 (0.85)	22.7 (0.86)
	CG	22.1 (0.75)	22.1 (0.75)	22.7 (0.74)
Self-efficacy (SWE)	EG	27.7 (0.91)	29.5 (0.92)	31.0 (0.93)
	CG	28.0 (0.81)	28.4 (0.82)	30.0 (0.81)
Satisfaction with life (SWLS)	EG	22.8 (0.98)	25.4 (1.00)	24.3 (1.00)
	CG	22.0 (0.88)	22.9 (0.88)	23.7 (0.87)
Depression (ADS-K)	EG	32.7 (1.14)	25.8 (1.18)	28.0 (1.20)
	CG	29.9 (1.04)	28.5 (1.05)	28.0 (1.03)
Positive affect (SPANE)	EG	20.7 (0.72)	23.4 (0.56)	23.5 (0.79)
	CG	21.4 (0.71)	21.0 (0.70)	22.6 (0.65)
Negative affect (SPANE)	EG	17.0 (0.82)	14.5 (0.84)	14.6 (0.85)
	CG	16.2 (0.74)	15.6 (0.75)	14.5 (0.74)
Hopelessness (H-RA Scale)	EG	29.7 (1.26)	24.0 (1.30)	24.4 (1.31)
	CG	28.3 (1.14)	29.3 (1.15)	26.4 (1.13)
Subjective stress experience (TICS-SCSS)	EG	21.9 (1.49)	14.2 (1.53)	15.7 (1.55)
	CG	18.5 (1.34)	17.8 (1.36)	16.2 (1.33)

N=66. ADS-K=General Depression Scale; H-RA Scale=Hopelessness Scale, revised; LOT-R=Life-Orientation Test, revised; OFS=Openness to the Future Scale; SPANE=Scale of Positive and Negative Experience; SWE=General Self-Efficacy Scale; SWLS=Satisfaction with Life Scale; TICS-SCSS=Trier Inventory of Chronic Stress, screening version; WHO-5=the World Health Organization's well-being index; EG=experimental group; CG=waitlist control group. Time 1=preintervention for the experimental group and first measurement for the control group, Time 2=postintervention for the experimental group and second measurement for the control group, Time 3=followup 1 month after the intervention for the experimental group and third measurement for the control group

[*]p<.05; [**]p<.001

4.1 Main Analyses

4.1.1 Primary Outcomes

Well-being. We detected significant Group×Time interactions. Compared to the control group, which did not change over time, well-being increased in the experimental group with large effect sizes between T1 and T2 ($B=-4.55$, $SE=1.05$, 95% CI [−6.59, −2.52], $t=-4.34$, $p<0.001$, $d=1.24$) and between T1 and T3 ($B=-3.06$, $SE=1.04$, 95% CI [−5.09, −1.04], $t=-2.94$, $p=0.003$, $d=0.83$). Post hoc tests showed that well-being increased significantly from T1 to T2 ($p<0.001$, $d=1.09$). Furthermore, well-being was higher after coaching (T2) compared to at the T2 measurement of the control group ($p<0.001$, $d=1.33$). At T3, participants in the experimental group also reported higher well-being compared to the control group ($p=0.045$, $d=0.55$) and compared to their well-being at T1 ($p<0.001$, $d=1.20$).

Openness to the future. A significant Group×Time interaction was found, showing a difference with a medium effect size between T1 and T2 in the experimental group, whereas no difference was found in the control group, which did not change over time ($B=-3.50$, $SE=1.29$, 95% CI [−6.03, −0.97], $t=-2.71$, $p=0.007$, $d=0.56$). Post hoc tests indicated that openness to the future increased significantly from T1 to T2 in the experimental group ($p<0.001$, $d=0.80$). However, openness to the future was not higher after coaching (T2) in the experimental group compared to at the T2 measurement of the control group ($p=0.355$, $d=0.34$). Furthermore, we found no significant difference between T1 and T3 in the experimental group compared to the control group ($B=-1.67$, $SE=1.29$, 95% CI [−4.21, 0.87], $t=-1.29$, $p=0.197$, $d=0.19$).

4.1.2 Secondary Outcomes

Optimism. A significant Group×Time interaction was found, showing a difference with a medium effect size between T1 and T2 in the experimental group compared to the control group ($B=-2.35$, $SE=0.94$, 95% CI [−4.19, −0.51], $t=-2.50$, $p=0.013$, $d=0.54$). Post hoc tests revealed that optimism increased from T1 to T2 ($p<0.001$, $d=0.68$). However, optimism was not significantly higher after coaching (T2), compared to the T2 measurement of the control group ($p=0.299$, $d=0.28$). Furthermore, we found no significant difference between T1 and T3 in the experimental group compared to the control group ($B=-1.14$, $SE=0.94$, 95% CI [−2.98, 0.71], $t=-1.21$, $p=0.228$, $d=0.25$).

Self-efficacy. No significant enhancement of the model was found by adding the Group×Time interaction, $\chi^2(2)=2.62$, $p=0.27$.

Satisfaction with life. No significant enhancement of the model was detected by adding the Group×Time interaction, $\chi^2(2)=3.72$, $p=0.16$.

Depression. We found a significant Group×Time interaction, indicating a difference with a large effect size between T1 and T2 in the experimental group compared to the control group ($B=5.53$, $SE=1.78$, 95% CI [2.04, 9.02], $t=3.11$, $p=0.002$, $d=0.93$). Post hoc tests showed that depression decreased from T1 to T2 in the experimental group ($p<0.001$, $d=0.88$). However, depression was not significantly lower after coaching (T2) compared to the T2 measurement of the control group ($p=0.075$, $d=0.49$). Furthermore, we found no significant difference between T1 and T3 in the experimental group compared to the control group ($B=2.61$, $SE=1.78$, 95% CI [−0.88, 6.10], $t=1.47$, $p=0.143$, $d=0.26$). Despite this, at T3, participants in the experimental group reported higher well-being compared to T1 ($p=0.002$, $d=0.82$).

Positive affect. We found a significant Group×Time interaction, showing a difference with a large effect size between T1 and T2 in the experimental group compared to the control group ($B=-2.98$, $SE=0.97$, 95% CI [-4.89, -1.08], $t=-3.07$, $p=0.002$, $d=0.80$). Post hoc tests showed that positive affect increased from T1 to T2 ($p=0.002$, $d=0.61$). In addition, positive affect was higher in the experimental group compared to the control group at the T2 measurement ($p=0.011$, $d=0.68$). Furthermore, we found no significant difference between T1 and T3 in the experimental group compared to the control group ($B=-1.70$, $SE=0.97$, 95% CI [-5.09, -1.04], $t=-1.75$, $p=0.080$, $d=0.40$). However, post hoc tests showed that the effect remained stable from T2 to T3 in the experimental group ($p=0.002$, $d=0.73$).

Negative affect. No significant enhancement of the model could be found by adding the Group×Time interaction, $\chi^2(2)=3.93$, $p=0.14$.

Hopelessness. We found significant Group×Time interactions. Compared to the control group, hopelessness decreased with a large effect size between T1 and T2 in the experimental group ($B=6.64$, $SE=1.68$, 95% CI [3.35, 9.94], $t=3.95$, $p<0.001$, $d=1.02$) and with a medium effect size between T1 and T3 ($B=3.43$, $SE=1.68$, 95% CI [0.13, 6.73], $t=2.04$, $p=0.041$, $d=0.52$). Post hoc tests revealed that hopelessness decreased significantly from T1 to T2 and T3 measurements (between T1 and T2: $p<0.001$, $d=0.77$; between T1 and T3: $p=0.001$, $d=0.73$). Moreover, hopelessness was lower in the experimental group compared to the control group at the T2 measurement ($p=0.001$, $d=0.92$). However, at T3, participants in the experimental group did not report significantly lower hopelessness compared to the control group ($p=0.237$, $d=0.32$).

Subjective distress. Significant interactions were found. Compared to the control group, which did not change over time, subjective distress decreased in the experimental group with a large effect size between T1 and T2 ($B=6.92$, $SE=1.95$, 95% CI [3.10, 10.75], $t=3.55$, $p<0.001$, $d=0.90$) and with a medium effect size between T1 and T3 ($B=3.87$, $SE=1.95$, 95% CI [0.04, 7.69], $t=1.98$, $p=0.048$, $d=0.50$). Post hoc tests showed that subjective distress reduced from T1 to T2 significantly and with a large effect size ($p<0.001$, $d=1.42$). Furthermore, post hoc tests showed that this effect remained stable at T3 (between the T1 and T3 measurements: $p=0.001$, $d=0.85$). However, subjective distress was not lower after coaching (T2, T3) compared to the T2 and T3 measurements of the control group ($p=0.086$, $d=0.47$; $p=0.805$, $d=0.07$, respectively).

4.2 Mediation Analyses

The mediation analyses found only one significant effect: The effect of coaching on openness to the future was mediated by the reduction of hopelessness ($B=0.47$, 95% CI [-0.82, -0.07]; Fig. 2 and Table 4). All other mediation analyses yielded no significant results: There was no mediational effect of coaching on well-being mediated by hopelessness ($B=-0.09$, 95% CI [-0.39, 0.19]; Fig. 3 and Table 4), none on well-being mediated by self-efficacy ($B=-0.06$, 95% CI [-0.23, 0.03]; Fig. 4 and Table 4), and none on openness to the future mediated by self-efficacy ($B=-0.14$, 95% CI [-0.49, 0.04]; Fig. 5 and Table 4).
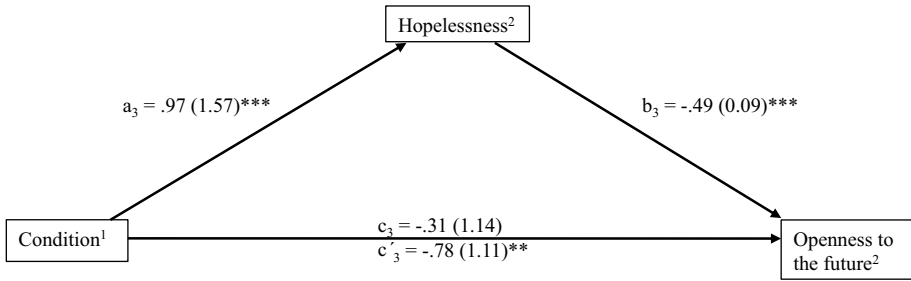
Fig. 2 Model 3: openness to the future as outcome and hopelessness as mediator *Note*. [1] Experimental group, control group; [2]Changes from the first measurement to the second measurement (difference scores: Measurement 2—Measurement 1); $n = 54$. **$p < .01$; ***$p < .001$

Table 4 Simple mediation models with well-being and openness to the future as outcome variables and hopelessness and self-efficacy as mediators

Model	Standardized β coefficient	SE	t	p	95% CI	
					LL	UL
Well-being as outcome ($n = 52$)						
a_1 Condition () Hopelessness	.93	1.60	3.74	<.001	2.77	9.21
a_2 Condition () Self-efficacy	−.39	0.90	− 1.43	0.16	− 3.09	0.52
b_1 Hopelessness () Well-being	−.10	0.10	− 0.68	.500	− 0.27	0.13
b_2 Self-efficacy () Well-being	.16	0.17	1.31	.198	− 0.12	0.58
c'_1 Condition () Well-being	−.88	1.27	− 3.18	.003	− 6.58	− 1.48
c_1 Condition () Well-being	−.97	1.12	− 3.97	<.001	− 6.68	− 2.19
c'_2 Condition () Well-being	−.91	1.13	− 3.66	<.001	− 6.41	− 1.87
c_2 Condition ()Well-being	−.97	1.12	− 3.97	<.001	− 6.68	− 2.19
Indirect effect						
a_1b_1 Condition () Well-being	−.09	0.15			− 0.39	0.19
a_2b_2 Condition () Well-being	−.06	0.07			− 0.23	0.03
Openness to the future as outcome ($n = 54$)						
a_3 Condition () Hopelessness	.97	1.57	4.06	<.001	3.22	9.53
a_4 Condition () Self-efficacy	−.34	0.88	− 1.24	.220	− 2.84	0.67
b_3 Hopelessness () Openness to the future	−.49	0.09	− 3.71	<.001	− 0.50	− 0.15
b_4 Self-efficacy () Openness to the future	.42	0.16	3.58	<.001	0.25	0.88
c'_3 Condition () Openness to the future	−.31	1.14	− 1.19	.239	− 3.64	0.94
c_3 Condition () Openness to the future	−.78	1.11	− 3.10	.003	− 5.64	− 1.21
c'_4 Condition () Openness to the future	−.64	1.01	− 2.77	.008	− 4.84	− 0.78
c_4 Condition () Openness to the future	−.78	1.11	− 3.10	.003	− 5.65	− 1.21
Indirect effect						
a_3b_3 Condition () Openness to the future	−.47	0.19			− 0.82	− 0.07
a_4b_4 Condition () Openness to the future	−.14	0.14			− 0.49	0.04

c = total effect; c' = direct effect; Condition = experimental group/control group; CI = confidence interval; *LL* = lower limit; *UL* = upper limit
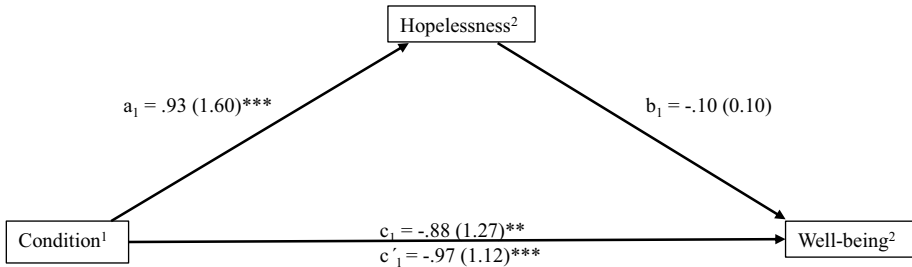
Fig. 3 Model 1: well-being as outcome and hopelessness as mediator *Note.* [1] Experimental group, control group; [2] Changes from the first measurement to the second measurement (difference scores: Measurement 2—Measurement 1). $n = 52$. $**p < .01$; $***p < .001$
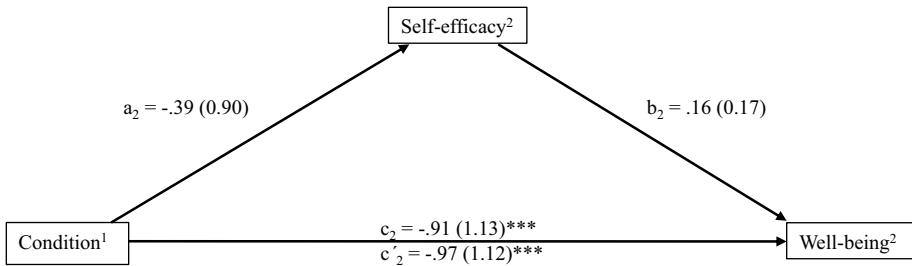
Fig. 4 Model 2: well-being as outcome and self-efficacy as mediator *Note.* [1] Experimental group, control group. [2] Changes from the first measurement to the second measurement (difference scores: Measurement 2—Measurement 1); $n = 52$. $***p < .001$
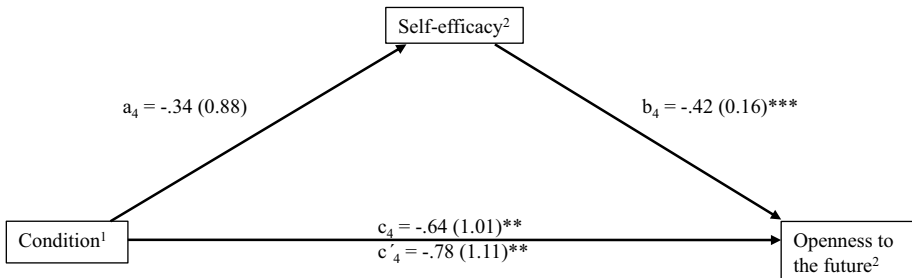
Fig. 5 Model 4: openness to the future as outcome and self-efficacy as mediator *Note.* [1] Experimental group, control group; [2] Changes from the first measurement to the second measurement (difference scores: Measurement 2—Measurement 1); $n = 54$. $**p < .01$; $***p < .001$

5 Discussion

5.1 Primary Variables

The aim of the present study was to develop, implement, and evaluate a group coaching program based on the theory of prospection. The manual for our program was based on Seligman et al. (2016) and MacLeod (2017). In this program, we applied exercises with prospective content as well as psychoeducational instructions to convey knowledge about prospection to a German-speaking, subclinical sample. In our evaluation study, we examined whether

various facets of participants' well-being and openness to the future improved and measures of negative mood decreased. A waitlist control group served as the comparison condition.

We used openness to the future as a measure of participants' prospective skills. The results of our study show that participants developed more prospective skills after the prospective coaching. This effect may be due to the future-oriented imagination exercises, such as the best possible self exercise, as it involved participants imagining their future and anticipating positive experiences (see Botella et al., 2018). Similarly, Namaky et al.'s (2021) program to change cognitive biases targeting prospective skills led to more positive future expectations.

The observed improvement in subjective well-being is in line with the findings of various studies. For instance, Vilhauer (2014) also found an improvement in well-being in FDT, which, similar to our coaching intervention, focuses on increasing positive future expectation. The effects obtained in the present work can also be attributed to specific activities of the prospective coaching intervention: Increased well-being, for example, may result from developing personally meaningful goals, expecting them to be realized, and acting on them. Consistent with this, Carver and Scheier (1990) found that goals and goal pursuit are associated with well-being. In addition, subjective well-being was found to correlate with positive future thinking (MacLeod & Conway, 2005) and imagining one's personal future was found to influence well-being (Schubert et al., 2020). Consequently, exercises imagining a positive personal future could be responsible for this increased well-being.

5.2 Secondary Variables

Hopelessness was reduced following the prospective coaching intervention. Studies examining prospection and future-oriented thinking support this result (MacLeod, 2017, p. 35). For example, greater hopelessness correlated with more expected negative future events in a task in which participants were asked to think about possible future events (Sidley et al., 1999). Thus, future expectations targeted in the coaching intervention could be responsible for the effect. In addition, Ferguson et al. (2009) found that their training focusing on improving goal setting and planning skills led to a reduction of hopelessness. Since the participants in our prospective coaching also had to work on goals and plans, it makes sense to assume that the observed reduction in hopelessness could be attributed to this.

One possible explanation for the reduction in subjective distress could be that our participants had to practice specific future-oriented thinking and planning. Indeed, a lack of specific future-oriented thinking can lead to emotional distress (MacLeod, 2017, p. 248), whereas planning is generally negatively associated with distress (Seligman et al., 2016, p. 169). In line with this, the goals and plans program described above, which focuses on establishing and following plans, also resulted in lower levels of distress (Dubé et al., 2007). One explanation for this finding could be that having a plan in place provides clarity and structure when one is overwhelmed by distress (Seligman et al., 2016, p. 169) and contributes to more deliberate action (Doerflinger et al., 2017).

The improvement in optimism following our coaching intervention is consistent with findings from the literature. For example, King (2001) found increased optimism after participants performed the best possible self writing exercise, and Blackwell and colleagues (2013) observed a correlation between imagining positive future events and optimism. The goal of our coaching program was to guide the participants' thinking about the future and their own behavior in such a way that they could develop a positive attitude toward their future. In this regard, the improvement in optimism could be thanks, on the one hand, to the development of desire-forming imaginings (the best possible self exercise). On the other hand, the formulation of a concrete plan to develop strategies for facing possible obstacles through the action plan exercise could also have been a reason for the improvement in optimism. Through the action plan exercise, participants were able to

develop flexible and realistic optimism. According to Forgeard and Seligman (2012), such general optimism, which can be reduced at certain times, is the most profitable orientation for the future.

We found no significant increase in self-efficacy as a result of our coaching intervention. This is in contrast to a number of studies that found a relationship between self-efficacy and future-oriented thinking. For example, self-efficacy is positively related to planning (Jones et al., 2001). It is possible that a significant effect would have been found if coaching had lasted longer and participants were thus more likely to achieve their coaching goal. A central source of self-efficacy is the experience of being successful by achieving goals (Bandura, 1994). Thus, it is possible that participants' personal goals were not fully achieved despite anticipation and planning during the coaching process, as final goal achievement may not have occurred until long after the final data collection.

The increase in positive affect is likely thanks to the future-oriented imagination exercises included in our prospective coaching program. For example, the best possible self exercise, imagining one's own successful future, was found to improve positive affect (Carrillo et al., 2019). Furthermore, visual mental imagery has been associated with positive affect in depressed individuals (Slofstra et al., 2018), which supports our findings, considering that we had a subclinically depressed sample. Moreover, an increase in positive affect was found after a brief training on detailed thinking about future events (Jing et al., 2016). This finding also supports the present result, as participants were required to think in detail about their future at various points during the prospective coaching intervention (e.g., elaboration of their own desires and goals, guided imagination, application of the SMART method).

Similar to our program, other trainings and therapies with a future-oriented focus have been found to reduce depressed-like symptoms (Cheavens et al., 2006; Van Beek, 2013; Vilhauer et al., 2013). However, we found, in contrast to results on depressed-like symptoms, no significant reduction in negative affect. These seemingly contradictory results might be due to depression being associated with a lower number of future-oriented positive thoughts, but not with a higher number of future-oriented negative thoughts (MacLeod & Byrne, 1996; Stöber, 2000). For example, people with depression generated fewer and less detailed future scenarios about a self-set goal, which is a positive thought (Addis et al., 2016). Consistent with our findings, there was also no reduction in negative affect in the goals-and-plans training (MacLeod et al., 2008). One possible reason for this could be that the present intervention, like the goals-and-plans training, focused on positive engagement with goals and plans rather than on reducing negative feelings.

The lack of a direct effect of prospection could be a possible reason why no significant effect on satisfaction with life was found. For example, the effects of future-oriented planning strategies on satisfaction with life have been found to be mediated by control beliefs (Prenda & Lachman, 2001). Our finding is also supported by two treatments aimed at improving mental time travel in individuals with schizophrenia (Chen et al., 2017, 2020). These treatments are similar to our prospective coaching intervention in that one of their goals is to improve prospective abilities. As in our study, Chen et al., (2017, 2020) found no effect on satisfaction with life. Moreover, a lack of effect on satisfaction with life could be due to the brevity of our intervention. To change satisfaction with life, coaching should probably last longer than three sessions. For example, when the total duration of the intervention was 30 h, FDT increased satisfaction with life (Vilhauer et al., 2013). It is worth noting that despite the nonsignificant interactions, small effects were found for satisfaction with life and negative affect (satisfaction with life: $d = 0.33$ between T1 and T3 and between the T2 and T3; negative affect: $d = 0.34$ between T1 and T3 and $d = 0.46$ between the T2 and T3). Thus, it is possible that the interactions did not become significant because of the small sample size of our study.

5.3 Mediation Analyses

The mediation analyses showed that only hopelessness significantly mediated the relationship between participation in coaching and openness to the future. In other words, hopelessness decreased following the prospective coaching intervention, which led to an increase in openness to the future. This finding suggests that intervening in hopelessness may play a crucial role in improving openness to the future. This finding may relate to the relationship between (high) future orientation and (low) hopelessness (Breier-Williford & Bramlett, 1995) or the correlation between (high) hopelessness and (low) positive expectancies (MacLeod & Cropley, 1995). In one study, hopeless people considered attaining their goals to be crucial for their happiness but simultaneously, they considered those goals to be unattainable (Danchin et al., 2010). Consequently, goals that were previously considered unattainable but that appeared realizable after the coaching intervention may be responsible for the increased openness to the future.

It is surprising that the training effects on well-being were not mediated by changes in hopelessness and self-efficacy, since, as described at the outset, such relationships have been reported in the literature (Bandura, 2010; Buzzai et al., 2020). It is particularly unexpected that no relationship was found between hopelessness and well-being (Path b in Mediation Model 2), as both variables improved after the coaching intervention. The lack of association between these variables is one reason why we could not find an effect, at least for this mediation model.

5.4 Summary

Overall, we can conclude that after attending our prospective coaching intervention, participants improved in well-being and openness to the future and in two variables related to mental health (optimism, positive affect) and decreased in those related to mental disorders (depression, hopelessness, subjective distress). However, no significant effects were found on self-efficacy, satisfaction with life, and negative affect. A closer look at the means and dynamics of these variables reveals that these increased not only in the intervention but also in the control group over time. One explanation for this increase in the control group could be that participants experienced increased positive thoughts due to their anticipation of the beginning of the coaching intervention. Participants in the control group had the opportunity to receive the coaching intervention after the study's end, so they may have experienced a slight improvement in their mental state as a result of this knowledge.

5.5 Limitations

The results of the present study must be interpreted with the following limitations in mind. One limitation is the small and selective (74% female) sample. With regard to the quality criteria, it should be noted that the nonrandom allocation to the experimental and control groups might have confounded treatment effects. Despite this limitation, it has to be mentioned that comparing the dependent variables at T1 did not show any significant differences between the two groups. This suggests that the confounding effect of the lack of randomization was minimal.

The exclusive use of self-assessment questionnaires is a further limiting factor as it can lead to reduced external or construct validity (Heppner et al., 2015, p. 157). In future studies, it would be preferable to use other measures such as rating by others (e.g., by partners), psychometric tests (e.g., to test planning abilities), or neurocognitive measurements, such as electroencephalogram (EEG) or functional magnetic resonance imaging (fMRI). For example, subjects

could be given the task of imagining their future while undergoing fMRI, before and after the prospective coaching intervention, to measure prospective abilities more objectively. In addition, neurofeedback (e.g., via EEG) could be used to enhance treatment effects, too.

In addition, the OFS used in the present study was applied to capture prospection ability. The Pragmatic Prospection Scale (Taylor et al., 2019), which was not available at the time, builds on Baumeister et al. and's () theory of prospection. Therefore, this scale should be applied in a further study on the evaluation of the prospective coaching intervention to gain more sophisticated insights into pragmatic prospection abilities.

6 Conclusion and Practical Implications

One of the primary benefits of the prospective coaching intervention is its low cost: the program consists of only three sessions and is applicable in a group setting, allowing many individuals to be coached at the same time within a short time frame. We also want to stress the preliminary value of the results, as the present study represents a pilot project. No comparable group interventions with a focus on prospection exist to this date, and hence, we believe future research should focus on further investigating prospection-focused interventions as well as replicating the current program.

As explained in the Introduction, unlike the past, it is the future that people can actively influence and change. In line with Seligman et al. (2016), our study shows that it is important for research and practice to integrate an explicit focus on prospection because there is an indication that it leads to improved well-being and increased openness to the future. The present findings suggest that the prospective coaching approach is useful in health promotion, specifically in increasing well-being and positive affect, and in reducing depressed mood, subjective distress, and hopelessness. Future research should aim to ensure the best possible application of prospective interventions in practice through a sophisticated understanding of their potential and effects. It seems particularly useful to advance the practical application of prospection in clinical samples, such as in the context of psychotherapy. Prospection is likely to be particularly useful in the treatment of schizophrenia (Painter & Kring, 2016), pathological gambling (Noël et al., 2017), and depression and anxiety (Güllner, 2021). For depression and anxiety, Seligman and colleagues have previously called for prospection to be integrated as an integral part of therapies (Seligman et al., 2016, pp. 291; 295).

To summarize, the present work provides primary evidence for the effectiveness of the prospective coaching approach in fostering well-being and future-related thinking and acting and in preventing negative mood. Therefore, it seems reasonable to suggest its intensive application and evaluation in both prevention and mental health promotion, as well as in clinical contexts.

Appendix A: Model Building Processes for the Linear Mixed Models

Tables below are adapted from Meteyard, L., & Davies, R. A. (2020). Best practice guidance for linear mixed-effects models in psychological science. *Journal of Memory and Language*, *112*, 104092. https://doi.org/10.1016/j.jml.2020.104092

See Tables 5, 6, 7, 8, 9, 10, 11, 12, 13 and 14.

Table 5 WHO-5 (well-being)

| Sampling Units | | N total observations = 179 N Subjects = 66 | | | | | | | | |

Model specification	Model name	Nested/simpler model	Fixed effects added	Random effect Subjects	Model fit			LRT Test against nested		
					AIC	BIC	LL	df	df	X2
Random Effects only	Null	–	–	intercepts	985	994	–489	3		
Fixed Effects main effects	Main effects	Null	Group + Measurement Time	intercepts	973	992	–481	6	3	17.8***
Fixed Effects two-way interactions	Group x Measurement Time	Main effects	Group x Measurement Time	intercepts	958	983	–471	8	5	19.2***

AIC Aikake Information Criterion, *BIC* Bayesian Information Criterion, *LL* LogLikelihood, *df* degrees of freedom, *LRT* Likeilhood Ratio Test, *X2* Chi-square; '***' – 0.001; '**' – 0.01; '*' – 0.05; '.' – 0.1; ' ' – 1; Model Specification—the current model and what it includes or what was added to the previous model.; Nested/simpler model—the model against which the current one is being tested, using the Model Name as a label.; Fixed effects added—the fixed effects which have been added

Table 6 OFS (openness to the future)

| Sampling Units | | N total observations = 172, N Subjects = 62 | | | | | | | | |

Model specification	Model name	Nested/simpler model	Fixed effects added	Random effect	Model fit				LRT Test against nested	
				Subjects	AIC	BIC	LL	df	df	X2
Random Effects only	Null	–	–	intercepts	1048	1058	–521	3		
Fixed Effects main effects	Main effects	Null	Group + Measurement Time	intercepts	1045	1063	–516	6	3	9.88*
Fixed Effects two-way interactions	Group x Measurement Time	Main effects	Group x Measurement Time	intercepts	1041	1066	-513	8	2	7.37*

AIC Aikake Information Criterion, *BIC* Bayesian Information Criterion, *LL* LogLikelihood; *df* degrees of freedom, *LRT* Likelihood Ratio Test, *X2*Chi-square, '***' – 0.001; '**' – 0.01; '*' – 0.05; '.' – 0.1; ' ' – 1; Model Specification—the current model and what it includes or what was added to the previous model.; Nested / simpler model—the model against which the current one is being tested, using the Model Name as a label.; Fixed effects added—the fixed effects which have been added

Table 7 LOT-R (optimism)

| Sampling Units | | | | | N total observations = 172, N Subjects = 62 | | | | | |

Model specification	Model name	Nested/simpler model	Fixed effects added	Random effect	Model fit				LRT Test against nested	
				Subjects	AIC	BIC	LL	df	df	X2
Random Effects only	Null	–	–	intercepts	929	938	–461	3		
Fixed Effects main effects	Main effects	Null	Group+Measurement Time	intercepts	928	947	–458	6	3	6.42
Fixed Effects two-way interactions	Group x Measurement Time	Main effects	Group x Measurement Time	intercepts	926	951	–455	8	2	6.29*

AIC Aikake Information Criterion, *BIC* Bayesian Information Criterion, *LL* LogLikelihood, *df* degrees of freedom, *LRT* Likeilhood Ratio Test, *X2* Chi-square; '***' – 0.001; '**' – 0.05; '*' – 0.05; '.' – 0.1; ' ' – 1; Model Specification—the current model and what it includes or what was added to the previous model.; Nested/simpler model—the model against which the current one is being tested, using the Model Name as a label.; Fixed effects added—the fixed effects which have been added

Table 8 SWE (self-efficacy)

| Sampling Units | N total observations = 172 N Subjects = 62 | | | | | | | | | |

Model specification	Model name	Nested/simpler model	Fixed Effects added	Random effect	Model fit				LRT Test against nested	
				Subjects	AIC	BIC	LL	df	df	X2
Random Effects only	Null	–	–	intercepts	961	971	–478	3		
Fixed Effects main effects	Main effects	Null	Group + Measurement Time	intercepts	941	960	–465	6	3	26.1***
Fixed Effects two-way interactions	Group x Measurement Time	Main effects	Group x Measurement Time	intercepts	943	968	–463	8	2	2.62

AIC Aikake Information Criterion, *BIC* Bayesian Information Criterion, *LL* LogLikelihood, *df* degrees of freedom, *LRT* Likelihood Ratio Test, X2 Chi-square; '***' – 0.001; '**' – 0.01; '*' – 0.05; '.' – 0.1; ' ' – 1; Model Specification—the current model and what it includes or what was added to the previous model.; Nested/simpler model—the model against which the current one is being tested, using the Model Name as a label.; Fixed effects added—the fixed effects which have been added

Table 9 SWLS (satisfaction with life)

Sampling Units		N total observations = 172 N Subjects = 62								
Model specification	Model name	Nested/simpler model	Fixed effects added	Random Effect	Model fit				LRT Test against nested	
				Subjects	AIC	BIC	LL	df	df	X2
Random Effects only	Null	–	–	intercepts	972	987	–486	3		
Fixed Effects main effects	Main effects	Null	Group + Measurement Time	intercepts	968	988	–479	6	3	14.4**
Fixed Effects two-way interactions	Group x Measurement Time	Main effects	Group x Measurement Time	intercepts	970	995	–477	8	2	3.72

AIC Aikake Information Criterion, *BIC* Bayesian Information Criterion, *LL* LogLikelihood, *df* degrees of freedom, *LRT* Likelihood Ratio Test, *X2* Chi-square; '***' –0.001; '**' – 0.01; '*' – 0.05; '.' –0.1; ' ' – 1; Model Specification—the current model and what it includes or what was added to the previous model.; Nested/simpler model—the model against which the current one is being tested, using the Model Name as a label.; Fixed effects added—the fixed effects which have been added

Table 10 ADS-K (depression)

Sampling Units	N total observations = 172 N Subjects = 62									
Model specification	Model name	Nested/simpler model	Fixed effects added	Random effect	Model fit				LRT Test against nested	
				Subjects	AIC	BIC	LL	df	df	X2
Random Effects only	Null	–	–	intercepts	1109	1119	–552	3		
Fixed Effects main effects	Maineffects	Null	Group + Measurement Time	intercepts	1095	1114	–542	6	3	19.9***
Fixed Effects two-way interactions	Group x Measurement Time	Main effects	Group x Measurement Time	intercepts	1090	1115	–537	8	2	9.58**

AIC Aikake Information Criterion, *BIC* Bayesian Information Criterion, *LL* LogLikelihood, *df* degrees of freedom, *LRT* Likeilhood Ratio Test, *X2* Chi-square; '***' –0.001; '**' –0.01; '*' – 0.05; '.' –0.1; ' ' –1; Model Specification—the current model and what it includes or what was added to the previous model.; Nested/simpler model—the model against which the current one is being tested, using the Model Name as a label.; Fixed effects added—the fixed effects which have been added

Table 11 SPANE (positive affect)

Sampling Units	N total observations = 172 N Subjects = 62									
				Random effect	Model fit				LRT Test against nested	
Model specification	Model name	Nested/simpler model	Fixed effects added	Subjects	AIC	BIC	LL	df	df	X2
Random Effects only	Null	–	–	intercepts	922	931	–458	3		
Fixed Effects main effects	Main effects	Null	Group + Measurement Time	intercepts	913	932	–451	6	3	14.9**
Fixed Effects two-way interactions	Group x Measurement Time	Main effects	Group x Measurement Time	intercepts	908	933	–446	8	2	9,49**

AIC Aikake Information Criterion, *BIC* Bayesian Information Criterion, *LL* LogLikelihood, *df* degrees of freedom, *LRT* Likeilhood Ratio Test, *X2* Chi-square; '***' −0.001; '**' −0.01; '*' −0.05; '.' −0.1; ' ' −1; Model Specification—the current model and what it includes or what was added to the previous model.; Nested/simpler model—the model against which the current one is being tested, using the Model Name as a label.; Fixed effects added–the fixed effects which have been added

Table 12 SPANE (negative affect)

Sampling Units	N total observations = 172 N Subjects = 62									
Model specification	Model name	Nested/simpler model	Fixed effects added	Random effect	Model fit				LRT Test against nested	
				Subjects	AIC	BIC	LL	df	df	X2
Random Effects only	Null	–	–	intercepts	942	951	–468	3		
Fixed Effects main effects	Main effects	Null	Group + Measurement Time	intercepts	931	950	–460	6	3	16.6***
Fixed Effects two-way interactions	Group x Measurement Time	Main effects	Group x Measurement Time	intercepts	931	957	–458	8	2	3.93

AIC Aikake Information Criterion, *BIC* Bayesian Information Criterion, *LL* LogLikelihood, *df* degrees of freedom, *LRT* Likelihood Ratio Test, *X2* Chi-square; '***' – 0.001; '**' – 0.01; '*' – 0.05; '˙' – 0.1; '˙' – 1; Model Specification – the current model and what it includes or what was added to the previous model.; Nested / simpler model – the model against which the current one is being tested, using the Model Name as a label.; Fixed effects added – the fixed effects which have been added

Table 13 H-Scale (hopelessness)

Sampling Units	N total observations = 172 N Subjects = 62									
Model specification	Model name	Nested/simpler model	Fixed effects added	Random effect	Model fit				LRT Test against nested	
					AIC	BIC	LL	df	df	X2
Random Effects only	Null	–	–	intercepts	1120	1130	–557	3		
Fixed Effects main effects	Main effects	Null	Group + Measurement Time	intercepts	1110	1129	–549	6	3	15.9**
Fixed Effects two-way interactions	Group x Measurement Time	Main effects	Group x Measurement Time	intercepts	1099	1124	–542	8	2	15.2***

AIC Aikake Information Criterion, *BIC* Bayesian Information Criterion, *LL* LogLikelihood, *df* degrees of freedom, *LRT* Likeilhood Ratio Test, *X2* Chi-square; '***' – 0.001; '**' – 0.01; '*' – 0.05; '·' – 0.1; ' ' – 1; Model Specification—the current model and what it includes or what was added to the previous model.; Nested/simpler model—the model against which the current one is being tested, using the Model Name as a label.; Fixed effects added—the fixed effects which have been added

Table 14 TICS (subjective stress)

Sampling Units	N total observations = 172 N Subjects = 62									
				Random effect	Model fit				LRT Test against nested	
Model specification	Model name	Nested/simpler model	Fixed effects added	Subjects	AIC	BIC	LL	df	df	X2
Random Effects only	Null	–	–	intercepts	1175	1184	– 584	3		
Fixed Effects main effects	Main effects	Null	Group + Measurement Time	intercepts	1161	1180	– 575	6	3	19.1***
Fixed Effects two-way inter-actions	Group x Measure-ment Time	Main effects	Group x Measurement Time	intercepts	1153	1178	– 569	8	2	12.4**

AIC Aikake Information Criterion, *BIC* Bayesian Information Criterion, *LL* LogLikelihood, *df* degrees of freedom, *LRT* Likelihood Ratio Test, X2 Chi-square, '***' – 0.001; '**' – 0.01; '*' – 0.05; '.' – 0.1; ' ' – 1; Model Specification—the current model and what it includes or what was added to the previous model; Nested/simpler model—the model against which the current one is being tested, using the Model Name as a label.; Fixed effects added—the fixed effects which have been added

Appendix B: Final Models of the Linear Mixed Models

Table 15 WHO-5 (well-being)

	Est/Beta	SE	95% CI	t	p
Fixed effects					
Intercept	13.52	0.68	12.19–14.84	19.80	<0.001
Group	0.93	0.92	− 0.85–2.71	1.02	0.309
Measurement Time 2	3.55	0.78	2.03–5.06	4.55	<0.001
Measurement Time 3	3.88	0.79	2.35–5.42	4.91	<0.001
Group X Measurement Time 2	− 4.55	1.05	− 6.59–− 2.52	− 4.34	<0.001
Group X Measurement Time 3	− 3.06	1.04	− 5.09–− 1.04 − 2.94		0.003
		Variance			SD
Random effects					
Participant (Intercept)		5.60			2.37
Residual		7.91			2.81
R^2		Marginal			Conditional
Model fit					
		0.14			0.50

p-values for fixed effects have been calculated using Satterthwaites approximations. Confidence Intervals have been calculated using the Wald method

Model equation: WHO5_SumScore ~ Gruppe + Messzeitpunkt + Gruppe * Messzeitpunkt + (1 | VpnCode-Screening)

Table 16 OFS (openness to the future)

	Est/Beta	SE	95% CI	t	p
Fixed effects					
Intercept	36.41	1.189	34.08–38.74	30.61	<0.001
Group	1.41	1.598	− 1.73–4.54	0.88	0.379
Measurement Time 2	4.01	0.954	2.14–5.87	4.20	<0.001
Measurement Time 3	1.80	0.968	− 0.09–3.70	1.86	0.062
Group X Measurement Time 2	− 3.50	1.291	− 6.03–− 0.97	− 2.71	0.007
Group X Measurement Time 3	− 1.67	1.294	− 4.21–0.87	− 1.29	0.197
		Variance			SD
Random effects					
Participant (Intercept)		26.70			5.17
Residual		11.50			3.39
R^2		Marginal			Conditional
Model fit					
		0.032			0.709

p-values for fixed effects have been calculated using Satterthwaites approximations. Confidence Intervals have been calculated using the Wald method

Model equation: Offenheit_SumScore ~ Gruppe + Messzeitpunkt + Gruppe * Messzeitpunkt + (1 | VpnCode-Screening)

Table 17 LOT-R (optimism)

	Est/Beta	SE	95% CI	t	p
Fixed effects					
Intercept	20.96	0.83	19.33–22.59	25.19	<0.001
Group	1.16	1.12	− 1.03–3.35	1.04	0.300
Measurement Time 2	2.28	0.70	0.92–3.64	3.28	<0.001
Measurement Time 3	1.72	0.71	0.34–3.10	2.44	0.015
Group X Measurement Time 2	− 2.35	0.94	− 4.19–− 0.51	− 2.50	0.013
Group X Measurement Time 3	− 1.14	0.94	− 2.98–0.71	− 1.21	0.228
		Variance			SD
Random effects					
Participant (Intercept)		12.58			3.55
Residual		6.11			2.47
R^2		Marginal			Conditional
Model fit					
		0.025			0.681

p-values for fixed effects have been calculated using Satterthwaites approximations. Confidence Intervals have been calculated using the Wald method

Model equation: LOT_SumScore ~ Gruppe + Messzeitpunkt + Gruppe * Messzeitpunkt + (1 | VpnCode-Screening)

Table 18 SWE (self-efficacy)

	Est/Beta	SE	95% CI	t	p
Fixed effects					
Intercept	28.16	0.86	26.47–29.84	32.67	<0.001
Group	− 0.57	1.10	− 2.72–1.58	− 0.52	0.603
Measurement Time 2	1.08	0.48	0.15–2.02	2.26	0.024
Measurement Time 3	2.56	0.48	1.63–3.50	5.36	<0.001
		Variance			SD
Random effects					
Participant (Intercept)		15.85			3.98
Residual		6.38			2.52
R^2		Marginal			Conditional
Model fit					
		0.05			0.73

p-values for fixed effects have been calculated using Satterthwaites approximations. Confidence Intervals have been calculated using the Wald method

Model equation: SWE_SumScore ~ Gruppe + Messzeitpunkt + (1 | VpnCodeScreening)

Table 19 SWLS (satisfaction with life)

	Est/Beta	SE	95% CI	t	p
Fixed effects					
Intercept	23.05	0.93	21.23–24.87	24.80	<0.001
Group	− 1.28	1.18	− 3.60–1.03	− 1.09	0.277
Measurement Time 2	1.68	0.52	0.65–2.70	3.21	0.001
Measurement Time3	1.67	0.52	0.65–2.70	3.22	0.001
	Variance				SD
Random effects					
Participant (Intercept)	18.34				4.28
Residual	7.56				2.75
R^2	Marginal				Conditional
Model fit					
	0.04				0.72

p-values for fixed effects have been calculated using Satterthwaites approximations. Confidence Intervals have been calculated using the Wald method

Model equation: SWLS_SumScore ~ Gruppe + Messzeitpunkt + (1 | VpnCodeScreening)

Table 20 ADS (depression)

	Est/Beta	SE	95% CI	t	p
Fixed effects					
Intercept	32.74	1.14	30.51–34.97	28.73	<0.001
Group	− 2.82	1.54	− 5.84–0.21	− 1.83	0.068
Measurement Time 2	− 6.91	1.31	− 9.49–-4.34	− 5.26	<0.001
Measurement Time 3	− 4.74	1.33	− 7.36–− 2.13	− 3.56	<0.001
Group X Measurement Time 2	5.53	1.78	2.04–9.02	3.11	0.002
Group X Measurement Time 3	2.61	1.78	− 0.88–6.10	1.47	0.143
	Variance				SD
Random effects					
Participant (Intercept)	13.0				3.6
Residual	22.1				4.7
R^2	Marginal				Conditional
Model fit					
	0.11				0.44

p-values for fixed effects have been calculated using Satterthwaites approximations. Confidence Intervals have been calculated using the Waldmethod

Model equation: ADS_SumScore ~ Gruppe + Messzeitpunkt + Gruppe * Messzeitpunkt + (1 | VpnCode-Screening)

Table 21 SPANE (positive affect)

	Est/Beta	*SE*	95% CI	*t*	*p*
Fixed effects					
Intercept	20.70	0.72	19.30–22.11	28.89	<0.001
Group	0.68	0.97	− 1.22–2.57	0.70	0.484
Measurement Time 2	2.71	0.72	1.31–4.12	3.78	<0.001
Measurement Time 3	2.82	0.73	1.40–4.25	3.88	<0.001
Group X Measurement Time 2	− 2.98	0.97	− 4.89–− 1.08	− 3.07	0.002
Group X Measurement Time 3	− 1.70	0.97	− 5.09–− 1.04	− 1.75	0.080
		Variance			SD
Random effects					
Participant (Intercept)		7.33			2.71
Residual		6.54			2.56
R^2		Marginal			Conditional
Model fit					
		0.08			0.57

p-values for fixed effects have been calculated using Satterthwaites approximations. Confidence Intervals have been calculated using the Wald method

Model equation: Spane_Positiv ~ Gruppe + Messzeitpunkt + Gruppe * Messzeitpunkt + (1 | VpnCode-Screening)

Table 22 SPANE (negative affect)

	Est/Beta	*SE*	95% CI	*t*	*p*
Fixed effects					
Intercept	16.54	0.77	15.03–18.06	21.43	<0.001
Group	0.03	0.97	− 1.86–1.93	0.03	0.974
Measurement Time 2	− 1.46	0.49	− 2.42–− 0.50	− 2.97	0.003
Measurement Time 3	− 1.99	0.49	− 2.95–− 1.03	−4.06	<0.001
		Variance			SD
Random effects					
Participant (Intercept)		11.68			3.42
Residual		6.70			2.59
R^2		Marginal			Conditional
Model fit					
		0.04			0.65

p-values for fixed effects have been calculated using Satterthwaites approximations. Confidence Intervals have been calculated using the Wald method

Model equation: Spane_Neg ~ Gruppe + Messzeitpunkt + (1 | VpnCodeScreening)

Table 23 H-Scale (hopelessness)

	Est/Beta	SE	95% CI	t	p
Fixed effects					
Intercept	29.67	1.26	27.20–32.14	23.55	<0.001
Group	− 1.39	1.70	− 4.71–1.94	-0.82	0.414
Measurement Time 2	− 5.68	1.24	− 8.11–− 3.24	-4.57	<0.001
Measurement Time 3	− 5.30	1.26	− 7.77–− 2.83	-4.21	<0.001
Group X Measurement Time 2	6.64	1.68	3.35–9.94	3.95	<0.001
Group X Measurement Time 3	3.43	1.68	0.13–6.73	2.04	0.041
		Variance			SD
Random effects					
Participant (Intercept)		23.2			4.82
Residual		19.6			4.43
R^2		Marginal			Conditional
Model fit					
		0.10			0.59

p-values for fixed effects have been calculated using Satterthwaites approximations. Confidence Intervals have been calculated using the Wald method

Model equation: H_SumScore ~ Gruppe + Messzeitpunkt + Gruppe *Messzeitpunkt + (1 | VpnCodeScreening)

Table 24 TICS (subjective stress)

	Est/Beta	SE	95% CI	t	p
Fixed effects					
Intercept	21.85	1.49	18.94–24.76	14.71	<0.001
Group	− 3.34	2.00	− 7.27–0.58	−1.67	0.095
Measurement Time 2	− 7.68	1.44	− 10.51–− 4.86	−5.33	<0.001
Measurement Time 3	− 6.15	1.46	− 9.01–− 3.28	−4.21	<0.001
Group X Measurement Time 2	6.92	1.95	3.10–10.75	3.55	<0.001
Group X Measurement Time 3	3.87	1.95	0.04–7.69	1.98	0.048
		Variance			SD
Random effects					
Participant (Intercept)		33.2			5.76
Residual		26.4			5.14
R^2		Marginal			Conditional
Model fit					
		0.09			0.56

p-values for fixed effects have been calculated using Satterthwaites approximations. Confidence Intervals have been calculated using the Wald method. Model equation: TICS_SumScore ~ Gruppe + Messzeitpunkt + Gruppe * Messzeitpunkt + (1 | VpnCodeScreening)

Appendix C

See Table 25.

Table 25 T-test results comparing the baseline measurements of the Experimental Group and the Control Group

Scale	t	df	p
Openness to the future	− 0.84	57	.403
Well-being	− 1.25	63	.216
Optimism	− 1.05	57	.618
Self-efficacy	− 0.47	57	.642
Satisfaction with life	0.65	57	.521
Depression	1.16	56	.251
Negative affect	0.756	57	.452
Positive affect	− 0.719	57	.475
Hopelessness	0.792	57	.432
Subjective stress	1.680	57	.099

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