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Coping styles and optimism predict different aspects of well-being in a randomised controlled trial of a tailored counselling intervention for injured workers

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Abstract

Objective: Many injured people suffer from reduced well-being and emotional distress even with mild-to-moderate accident-related injuries. This study aimed to identify moderators of treatment efficacy of a highly tailored multidisciplinary counselling intervention for injured workers.

Methods: We conducted exploratory moderator analyses of a prospective randomised controlled trial with 192 mild to moderately injured workers (71.9% men; $M_{age} = 50$) who were randomised to either a control group with case management only, or an intervention group with case management plus tailored counselling intervention. Seven moderators, including five coping styles, as well as dispositional optimism and pessimism, were assessed at baseline. The outcome measures, assessed at baseline and 12 months (post-measure) and 18 months (follow-up measure) post-injury, concerned five aspects of well-being: job and life satisfaction, negative feelings, well-being related to family and personal health.

Results: We found differential treatment effects, as participants low in social diversion ($d = 0.26$), high in emotion-oriented coping ($d = 0.64$) and low in optimism ($d = 0.48$) benefited from the tailored counselling intervention and showed enhanced well-being in different aspects of life. No other effects were significant.

Conclusion: The results suggest that our tailored counselling intervention has a modest effect on negative feelings for mild to moderately injured workers. Generally, dispositional optimism and coping styles should be considered in rehabilitation interventions of injured workers.

KEYWORDS
coping, counselling, injury, optimism, rehabilitation, well-being

Trial registration: This study was preregistered with ISRCTN (Identifier: ISRCTN0553468).

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1 | INTRODUCTION

An accident is defined as a sudden, unintentional, harmful impact of an unusual external factor on the human body resulting in impairment of physical, mental and psychological health, according to both the Swiss National Insurance Fund (Suva) and Swiss law. This definition includes recreational and work-related accidents but distinguishes accidents from illness and other forms of injury (Egli, 2018). Although many people who suffer an accident recover well and quickly, a significant proportion experience decreased well-being, prolonged working disability and emotional distress even in cases of mild-to-moderate accident-caused injuries (Kendrick, Coupland, et al., 2017; Kendrick, Kelllezi, et al., 2017). However, injured people often receive only fragmented care (Kendrick, Kelllezi, et al., 2017). Since accident-caused injuries may encompass numerous issues and can lead to just as many physical and psychological sequelae, there is a need for more flexible and individually tailored treatment options to meet the heterogeneity of complications.

The results of previous injury rehabilitation studies suggest that interventions should promote collaborative care, thereby broadening the treatment focus and applying a holistic biopsychosocial perspective (e.g. Bültmann et al., 2009; Cullen et al., 2018; Zatzick et al., 2004). This is further supported by findings that injured or ill workers can best return to work when involved individuals and stakeholders work collaboratively (Russell & Kosny, 2019).

In an effort to address this need, we conducted a randomised controlled trial (RCT) to investigate the efficacy of a highly tailored psychological counselling intervention (Hegy et al., 2021). Despite applying collaborative care and tailoring, we only found significant improvement in one of the five assessed domains of well-being: participants in the intervention group (IG) showed a significant decrease in negative feelings up until 18 months post-injury, with a moderate effect size ($d = 0.74$), compared with the participants in the control group (CG). Due to this overall rather limited effect, we decided to investigate possible moderators of the treatment. In addition to examining an intervention's effectiveness, the question of potential moderators, that is, what works best for whom, is a key aspect of intervention research (Grawe, 1997, 2004; Kraemer et al., 2002; Tornås et al., 2019). Knowledge of patient characteristics that moderate treatment outcomes could help personalise psychosocial rehabilitation treatment. However, to the best of our knowledge, no studies have evaluated treatment moderators for psychosocial rehabilitation interventions for the heterogeneous population of mild to moderately injured workers. In accordance with the biopsychosocial model of disability (Wade & Halligan, 2004, 2017), the evaluation of treatment moderators may provide unique, new and valuable information to guide further treatment decisions.

An additional factor supporting the examination of potential treatment moderators is the high attrition rates often reported in injury rehabilitation interventions (Giummarra et al., 2018; De Silva et al., 2009; Tecic et al., 2011). For example, in a review of five studies of psychosocial injury rehabilitation interventions, De Silva et al. (2009) reported attrition rates ranging from 47% to 66%. To prevent early treatment termination, the authors recommend conducting a reliable screening of the injured individuals and gaining a deeper understanding of differential treatment effects.

We implemented both of these recommendations, with the recommendation to gain a deeper understanding of treatment effects constituting the aim of the current study. More specifically, we examined moderators of treatment outcome by means of secondary exploratory analyses of the data of our aforementioned RCT (Hegy et al., 2021). Due to the lack of studies regarding moderators of treatment success of injury rehabilitation interventions, we adopted a hypothesis-generating approach with an exploratory analysis. We selected seven well-established predictors of adaptation to health-related adversities and of psychosocial treatment success that could generate specific hypotheses for further studies of differential treatment effects in injury rehabilitation (Livneh & Martz, 2014; Skogstad et al., 2014; Tough et al., 2017; Vassend et al., 2011). Those seven predictors consisted of five coping styles, dispositional optimism and dispositional pessimism.

Coping has been shown to influence the relationship between stressful life events and physical and psychological functioning by mitigating how a stressful life event is perceived and handled (Archer et al., 2019; Higgins & Endler, 1995; Langford et al., 2017; Tein et al., 2000). Since all people encounter challenges at some point in their lives, the way in which stressful events are dealt with and,

Implications for clinical practice

In our study, we found that injured workers low in social diversion, high in emotion-oriented coping and low in optimism benefited the most from our counselling intervention. Based on further inspection of the participants' individual treatment plans, we assume that different treatment components of our tailored intervention had an influence on these observed effects. First, a strong focus on participants' resources, strengths and potentials may have contributed to the reactivation of the participants' perceived social support (Flückiger et al., 2010). Additionally, psychoeducation on coping styles, the promotion of adaptive coping styles as an explicit therapeutic goal, and guiding patients towards adaptive emotion-oriented coping might be helpful elements to use when counselling injured workers (Zinman et al., 2014). Finally, challenging maladaptive beliefs through cognitive restructuring techniques might have contributed to a more optimistic outlook and to the establishment of a more optimistic view in psychotherapy settings (Carver et al., 2010). Although these findings need confirmation, our results provide preliminary evidence for differential treatment effects in injury rehabilitation, which could both guide further research efforts and support treatment decisions to facilitate patients' adjustment to accidental injuries.

related to this, how well-being is achieved or regained, is of great importance (Marroquín et al., 2017). In their seminal work, Lazarus and Folkman define coping as 'constantly changing cognitive and behavioral efforts to manage specific external and internal demands that are appraised as taxing or exceeding the resources of the person' (Lazarus & Folkman, 1984, p. 141). Based on this definition, it follows that coping can take different forms. These different forms are referred to as *coping styles*. Thus, we examined different coping styles, more specifically (a) *task orientation*, (b) *emotion orientation* and (c) *avoidance orientation: social diversion* as possible moderators of treatment on psychological well-being.

Coping styles can be influenced by different factors such as personality dispositions and traits, personal resources and beliefs about the self and the world (Lazarus, 2006). Defined as a personality trait reflecting a favourable orientation to the future (Carver et al., 2010), dispositional optimism has been found to be a resource for different work and health-related factors. For example, higher levels of dispositional optimism have been associated, among other things, with improved psychological functioning, adjustment following injury and earlier return to work (Cancelliere et al., 2016; Myhren et al., 2010; Wadey et al., 2013). Therefore, we decided to assess *generalised dispositional optimism* and its counterpart, *generalised dispositional pessimism*, as the sixth and seventh possible moderators.

2 | METHODS

The data used in the current study were collected in an RCT investigating the effects of a tailored multidisciplinary counselling intervention with the aim to support the adjustment process of injured workers (Hegy et al., 2021). We obtained ethics approval from the Ethics Committee of the University of Bern (No. 2011-04-172) and registered the study at the ISRCTN registry (ISRCTN05534684). The Clinical Trial Unit Bern, an independent national clinical trial management facility to coordinate patient-oriented clinical research, monitored and assessed the study.

2.1 | Recruitment and eligibility criteria

The study population consisted of German-speaking adult workers (≥18 years) who suffered an accident within three months prior to study participation. Participants were consecutively recruited in the main agency of Suva, the largest accident insurance company in Switzerland, with an average coverage of about 50% of all employees. Suva case managers were requested to screen all eligible claimants for the risk of a complicated rehabilitation process with an evaluated screening tool (Abegglen et al., 2017) within the first three months post-injury. Claimants were excluded if they were suffering from (a) severe injuries (e.g. head or spinal cord injuries), (b) occupationally related illnesses (e.g. pulmonary illness) or (c) degenerative conditions (e.g. rheumatoid arthritis). To be included, claimants further had to (a) be at least 18 years old, (b) have a working disability causing a complete working incapacity, (c) have a permanent employment contract and (d) live no more than 20 km away from Berne to ensure convenient accessibility to the intervention.

2.2 | Procedure

Suva claimants whose screening showed an increased risk for a complicated rehabilitation process were asked to participate in the study. Of those, claimants who gave written informed consent, fulfilled all inclusion criteria and did not fulfil any of the exclusion criteria were eligible to participate in the RCT and thus randomised to either the IG or CG. Participants in the CG received only conventional case management according to Suva's case management procedure (Scholz et al., 2016), which comprised the standard treatment (care as usual, CAU). Trained and experienced case managers provided support and personal assistance in all aspects of rehabilitation and work reintegration, with the primary aim of a fast and long-lasting work reintegration. In addition to CAU, participants in the IG also received a tailored counselling intervention and collaborative care.

The intervention was created individually for each participant based on the screening results and thus tailored to their requirements. If the screening results mainly indicated work-related distress, the participant received occupational counselling, which consisted of work-related diagnostics and a discussion of the participant's life and work-related goals, followed by a structured observation of the workplace and tailored job counselling. If the screening results mainly indicated psychological distress, the participant received mental health counselling, which consisted of integrative counselling including educational, cognitive and behavioural elements to support the psychosocial adaptation process to the accident-caused injury. If the screening indicated both work-related and psychological distress, the participant received both occupational and mental health counselling. Both the occupational and the mental health intervention focused on individual resource activation (Flückiger et al., 2010; Grawe, 2004) and life goal setting (Rose et al., 2017).

After the randomisation, participants were asked to complete the baseline questionnaire (T0) and were assessed again 12 (T1) and 18 months (T2) post-injury.

2.3 | Outcomes

We assessed five different aspects of subjective well-being as main outcomes. The first two aspects of subjective well-being were *life satisfaction* and *negative feelings*, which we both assessed with the two uncorrelated subscales of the Bern Questionnaire on Well-Being, adult form (BSW/A; Grob et al., 1991). Items are rated on 6-point Likert scales and 4-point Likert scales. The questionnaire has obtained satisfactory psychometric qualities concerning stability and validity (Grob et al., 1991). The internal consistency of the subscales is satisfactory, with Cronbach's $\alpha = 0.82$ (life satisfaction) and $\alpha = 0.77$ (negative feelings). As a third aspect of subjective

TABLE 1 Demographics and clinical characteristics of participants

	CG		IG		*t* (*df*)	χ^2 (*df*)	*p*
Age							
Mean (*SD*)	50.50	10.353	49.04	10.362	0.94 (*166.7*)		0.35
Gender (%)							
Female	31	31.00	23	25.00		0.58 (*1*)	0.45
Male	69	69.00	69	75.00			
Level of education (%)							
No high school diploma	70	70.70	64	69.56		0.70 (*2*)	0.71
High school and above	25	25.25	26	28.26			
Others	4	4.05	2	2.17			
Missing values	1		0				
Annual income at baseline							
Up to CHF 40,000	6	6.19	7	8.14		4.34 (*4*)	0.36
Up to CHF 60,000	21	21.65	16	18.60			
Up to CHF 80,000	30	30.92	30	34.88			
Up to CHF 100,000	27	27.84	15	17.44			
Over CHF 100,000	13	13.40	18	20.93			
Missing values	3		14				
Occupational classification (%)							
Blue-collar worker	60	60.60	64	69.57		1.31 (*1*)	0.25
White-collar worker	39	39.39	28	30.43			
Missing values	1		0				
Accident type (%)							
Recreational	70	76.09	60	67.42		1.28 (*1*)	0.26
Work-related	22	23.91	29	32.58			
Missing values	8		3				
Outcome variables							
Well-being (BWQ) at baseline							
Life satisfaction							
Mean (*SD*)	4.58	0.70	4.43	0.80	1.28 (*176*)		0.20
Negative feelings							
Mean (*SD*)	2.68	0.83	2.73	0.83	0.35 (*160*)		0.72
Job satisfaction (AKZ) at baseline							
Mean (*SD*)	4.73	1.18	4.70	1.19	0.18 (*172.4*)		0.86
Family-related satisfaction (IRES) at baseline							
Mean (*SD*)	3.16	0.92	3.12	0.87	0.28 (*182*)		0.78
Health-related satisfaction (IRES) at baseline							
Mean (*SD*)	4.13	0.70	4.07	0.61	0.64 (*183.7*)		0.52
Moderator variables							
Coping abilities (CISS) at baseline							
Task-orientated							
Mean (*SD*)	3.77	0.59	3.82	0.55	0.50 (*181.7*)		0.62
Emotion-orientated							
Mean (*SD*)	2.45	0.75	2.556	0.67	−0.96 (*178.6*)		0.34
Avoidance							
Mean (*SD*)	2.51	0.68	2.44	0.72	0.631 (*177.6*)		0.53

TABLE 1 (Continued)

	CG		IG		t (*df*)	χ^2 (*df*)	*p*
Distraction							
Mean (*SD*)	1.96	0.77	1.90	0.75	0.54 (*181*)		0.59
Social diversion							
Mean (*SD*)	3.06	0.87	3.01	0.90	0.43 (*180.9*)		0.67
Optimism (LOT-R) at baseline							
Optimism							
Mean (*SD*)	8.92	2.14	8.50	2.33	1.28 (*177.9*)		0.20
Pessimism							
Mean (*SD*)	4.72	2.23	5.08	2.39	−1.05 (*179.2*)		0.30

Note: CG = control group (n = 100), IG = intervention group (n = 92), comparison between CG and IG is performed by two-sided Welch's t test for continuous data and Yates continuity correction for the chi-squared test for categorical variables.
Degrees of freedom (*df*) (of the respective test) are given in italics.

well-being, we assessed *job satisfaction* by a single item of the Short Job Satisfaction Questionnaire (AZK; Baillod & Semmer, 1994): 'If there is no change of my work conditions sooner or later, I will look for a new job'. The answer was rated on a 7-point Likert scale. To assess the fourth and fifth aspects of subjective well-being, namely *family-related satisfaction* and *health-related satisfaction*, we used the two corresponding subscales of the Rehab Status Questionnaire Version 3 (IRES-3; Bührlen et al., 2005). All items of these two subscales are rated on 5-point Likert scales with high scores indicating lower family-related satisfaction and higher health-related satisfaction, respectively. The internal consistencies of all the questionnaire's subscales range from good to very good, with Cronbach's α between 0.75 and 0.94.

Of particular relevance to the present study are the potential moderators of treatment outcomes that were assessed. These included different coping styles and generalised dispositional optimism and pessimism. We assessed three different coping styles: (a) task-oriented coping (Cronbach's $\alpha = 0.83$), (b) emotion-oriented coping (Cronbach's $\alpha = 0.80$) and (c) avoidance by social diversion (Cronbach's $\alpha = 0.80$) with the German short version of the Coping Inventory for Stressful Situations (CISS; Kälin, 1995). Participants rated the extent to which they use these coping styles with 18 items using 5-point Likert scales. The generalised dispositional optimism and pessimism were assessed with the German Version of the Life Orientation Test Revised (LOT-R; Glaesmer et al., 2008). The LOT-R consists of 10 items that are rated on a 5-point Likert scale, of which 3 items each are analysed for optimism (Cronbach's $\alpha = 0.69$) and pessimism (Cronbach's $\alpha = 0.59$), respectively. The rest are filler items.

2.4 | Statistical analysis

Participants' characteristics were calculated at baseline using means and standard deviations. Following the *Consolidated Standards of Reporting Trials* (CONSORT), analyses were performed according to an intention-to-treat principle using all available data from all randomised participants (Chambless & Hollon, 1998). To accommodate between and within effects considering missing data and unequal numbers of observations, we fitted linear mixed models to the longitudinal measures of outcomes (Singer & Willett, 2003). At level I, the within-person level, time was specified using the measurement points: the baseline measurement (4–6 months after injury) was defined as 0, the post-measurement (12 months after injury) was defined as 1, and follow-up measurement (18 months after injury) was defined as 2. By doing so, the intercept could be interpreted as an outcome score at the baseline measurement. At level II, the between-person level, treatment conditions were specified as 0 for the CG and 1 for the IG. The analyses were conducted in R Statistical Language with the R package *nlme* (Pinheiro et al., 2021) using full maximum likelihood estimation. The normal distribution of the outcome variables was confirmed by inspecting the residual diagnostics of the fitted models.

For each outcome variable, the analysis proceeds through different steps according to the techniques described by Tasca and Gallop (2009). First, we estimated a null model (intercept-only model), which allowed an estimation of the proportion of variation between and within persons in the outcome variable. Then, we examined the within-person trajectories of change across sessions with the first model (unconditional growth model with random intercept). The second model (conditional growth model with random intercept and cross-level interaction) allowed us to examine the effect of the study conditions, that is, to evaluate whether the different study conditions had different rates of change across the three assessments.

Subsequent exploratory models were used to examine whether individual coping abilities and dispositional optimism and pessimism moderated the treatment efficacy of the intervention compared with the CG. For this purpose, we fitted four separate multilevel models for the subscales of the CISS, and two separate models for the two subscales of the LOT-R. The moderator variables were grand-mean-centred to create a meaningful null point. All these models include the main effect of (a) the respective moderator, (b) time, (c) condition, (d) all three two-way interactions and (e) the three-way

TABLE 2 Results of the multilevel models for change in life satisfaction across time and conditions and significant moderators

		Model 1 Unconditional growth model			Model 2 Conditional growth model (cross-level interaction)			Model 3 Conditional growth model (treatment and moderator)		
Fixed effects		***B***	***SE B***	***t***	***B***	***SE B***	***t***	***B***	***SE B***	***t***
Intercept	γ_{00}	4.48	0.06	81.37***	4.54	0.08	59.39***	4.54	0.08	58.45***
Treatment	γ_{01}				−0.11	0.11	−1.03	−0.11	0.11	−1.01
Time	γ_{10}	−0.01	0.02	−0.56	−0.05	0.03	−1.70	−0.05	0.09	−1.83†
Social diversion	γ_{02}							0.10	0.09	1.12
Time × Treatment	γ_{11}				0.08	0.04	1.88†	0.09	0.03	2.02*
Time × Diversion	γ_{12}							0.03	0.04	0.91
Treatment × Diversion	γ_{03}							0.17	0.03	1.32
Time × Treatment × Diversion	γ_{13}							−0.10	0.13	−2.01*
Random effects										
Intercept	$\sigma^2{}_0$	0.44	[0.35–0.55]		0.44	[0.35–0.55]		0.44	[0.35–0.56]	
Residual	$\sigma^2\varepsilon$	0.15	[0.13–0.18]		0.15	[0.13–0.18]		0.14	[0.11–0.17]	
Model fit		Dev	AIC	BIC	Dev	AIC	BIC	Dev	AIC	BIC
		865.06	873.06	889.84	861.4	873.4	898.5	827.6	849.6	895.5

Note: $n_1 = 490$, $n_2 = 191$; Model 3a: $n_1 = 183$, $n_2 = 477$; 95% confidence intervals in parentheses; *$p < .05$, **$p < .01$ and ***$p < .001$; †$p < .07$.

Abbreviations: AIC, Akaike information criterion; BIC, Bayesian information criterion; Dev, −2 × Log Likelihood (LL) of the model.

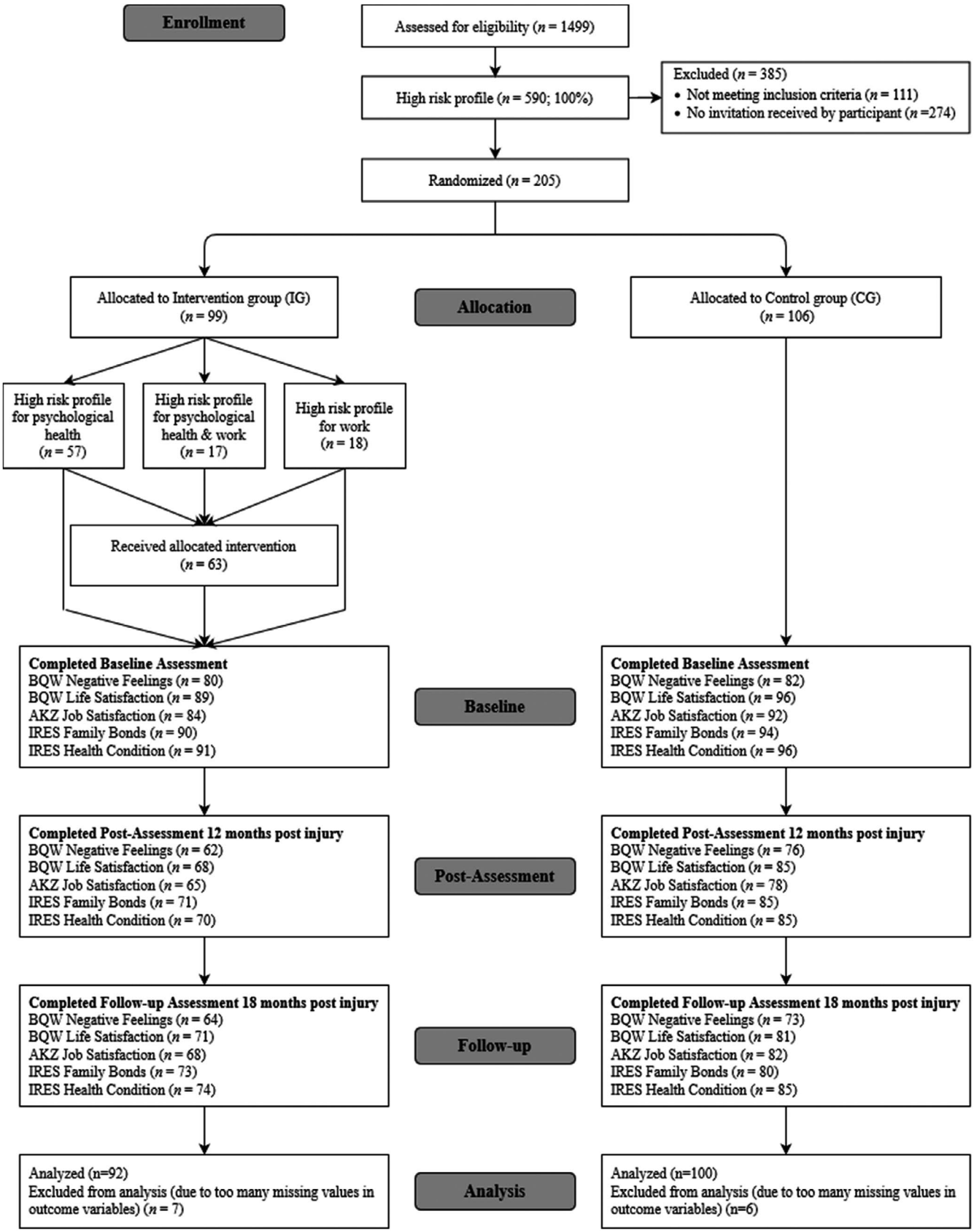

FIGURE 1 CONSORT flowchart of participants

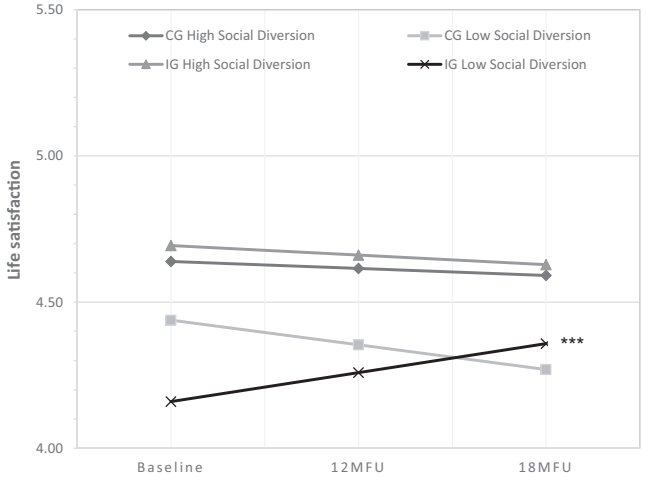

FIGURE 2 Moderating effect of social diversion on changes in life satisfaction for CG and IG. Note. ***$p < .001$, the scale of the y-axis starts with 4.0 and ends with 5.5

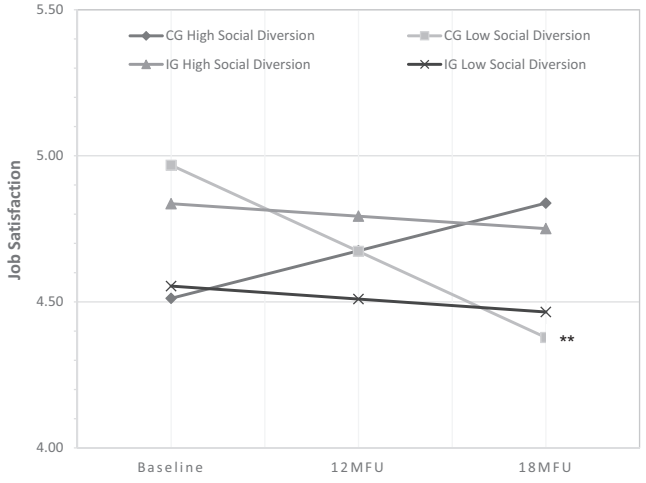

FIGURE 3 Moderating effect of social diversion on changes in job satisfaction for CG and IG. Note. **$p < .01$; the scale of the *y*-axis starts with 4.0 and ends with 5.5

interaction of the respective moderator variable with condition and time. To show that a variable is a moderator of the treatment success, this variable must not be correlated with the treatment (Beutler et al., 1991). Table 1 shows baseline values of the putative moderators. Our analyses revealed no significant differences between the two groups.

In case of a significant three-way interaction, we plotted the adjusted means of the subgroups to facilitate the interpretation of this effect. To guide our interpretation, we further conducted simple slopes analyses to test which slope differed significantly from zero (Preacher et al., 2006). We also conducted post hoc tests of the mean differences of these interactions for Time × Condition one standard deviation above (i.e. high level) and below (i.e. low level) the mean of the moderator, using the R package *phia* (De Rosario-Marinez et al., 2015). These follow-up analyses serve to illustrate the specific nature of the interactions.

We estimated all models as linear because of the sparse number of measurement points (Singer & Willett, 2003). The slopes in all models were fixed, as no model yielded significantly lower global fit indices when including random slopes. As a global effect size, we calculated Nagelkerke's pseudo-R^2 statistics, and as a local effect size, we calculated Cohens' *d*.

3 | RESULTS

The majority of the 192 participants of the final sample were male ($n = 138$; 71.9%) with a mean age of 49.8 years ($SD = 10.4$). Of the randomised participants whose screening results suggested mental health counselling ($n = 75$), 42 participants (56%) refused to participate. The remaining 33 participants received an average of 2.23 ($SD = 6.94$) mental health counselling sessions of approximately 50 min duration per session. Of the 35 participants whose screening results indicated a work-related high-risk profile, 30 participants (85.7%) received one session of occupational counselling and, if the employer agreed, a structured observational analysis of the workplace. We found no significant association with any sociodemographic variables or non-compliance. Figure 1 shows a CONSORT diagram of the flow of participants throughout the study.

Of the five evaluated coping styles, only social diversion and emotion-oriented coping were significant moderators of treatment success. We found that social diversion moderated the effect of treatment condition on changes in life satisfaction ($b = -0.10$, $SE = 0.048$, $p = .045$; Table 2). This model explained 52% of the variance (pseudo-R^2, adjusted by Nagelkerke).

According to the simple slopes analyses, only lower levels of social diversion predicted an increase in life satisfaction for participants in the IG ($b = 0.10$, $t(289) = 2.62$, $p < .001$). As can be seen in Figure 2, the simple slopes for participants in the CG were not significant ($b = -0.76$, $t(289) = 1.80$, $p = .073$). Post hoc contrast analyses revealed significant mean differences between the CG and the IG from T0 to T1 ($\chi^2(1) = 8.11$, $p < .05$), and from T0 to T2 ($\chi^2(1) = 7.99$, $p < .05$) for low social diversion scores. Cohen's *d* for the analysis from T0 to T2 was $d = -0.22$ in the CG and $d = 0.26$ in the IG, which correspond to small effects.

Furthermore, we found that social diversion moderated the effect of treatment condition on changes in job satisfaction ($\gamma = -0.23$, $SE = 0.099$, $p = .022$; Table 2). This model explained 30% of the variance (Nagelkerke's pseudo-R^2 statistics). According to the simple slopes analyses, lower levels of social diversion predicted a decrease in job satisfaction for participants in the CG ($b = -0.27$, $t(456) = -3.06$, $p = .002$). All three other simple slopes did not significantly differ from 0 (Figure 3). Post hoc contrast analyses revealed no significant mean differences between the CG and the IG for different measurement points in relation to high or low social diversion (Tables 3 and 4).

We also found that an emotion-oriented coping style moderated the effect of treatment condition on changes in negative feelings ($b = -0.02$, $SE = 0.080$, $p = .025$; Table 2). This model explained 54%

TABLE 3 Results of the multilevel models for change on negative feelings across time and conditions and significant moderators

		Model 1 Unconditional growth model			Model 2 Conditional growth model (cross-level interaction)			Model 3a Conditional growth model (treatment and moderator)			Model 3b Conditional growth model (treatment and moderator)		
Fixed effects		***B***	***SE B***	***t***	***B***	***SE B***		***B***	***SE B***	***t***	***B***	***SE B***	***t***
Intercept	γ_{00}	2.71	0.06	42.07***	2.70	0.09	30.20***	2.73	0.09	31.14***	2.71	0.09	30.46***
Treatment	γ_{01}				0.02	0.13	0.13	−0.04	0.12	−0.34	−0.01	0.13	−0.09
Time	γ_{10}	−0.09	0.03	−3.46***	−0.02	0.04	−0.67	−0.02	0.04	−0.69	−0.03	0.04	−0.91
Emotion-oriented	γ_{02}							0.40	0.12	3.41***			
Optimism	γ_{02}										−0.09	0.04	−2.08*
Time × Treatment	γ_{11}				−0.14	0.05	−2.69***	−0.14	0.05	−2.54**	−0.13	0.05	−2.59**
Time × Emotion-Oriented	γ_{12}							0.08	0.05	1.72			
Time × Optimism	γ_{12}										−0.04	0.02	−2.52*
Treatment × Emotion-Oriented	γ_{03}							0.12	0.18	0.70			
Treatment × Optimism	γ_{03}										−0.06	0.06	−1.12
Time × Treatment × Emotion	γ_{13}							−0.18	0.08	−2.36*			
Time × Treatment × Optimism	γ_{13}										0.07	0.02	3.05***
Random effects													
Intercept	σ20	0.56	[0.44–0.71]		0.56	[0.44 –0.71]		0.47	[0.37–0.61]		0.50	[0.39 –0.65]	
Residual	σ2ε	0.19	[0.16–0.23]	0.18	[0.15–0.22]	0.18	[0.15–0.22]	0.17	[0.14–0.20]				
Model fit		Dev	AIC	BIC	Dev	AIC	BIC	Dev	AIC	BIC	Dev	AIC	BIC
		883.2	891.5	907.8	875.4	887.4	911.9	817.7	837.7	878.2	818.9	832.9	861.2

Note: $n_1 = 437$, $n_2 = 182$; Model 3a: $n_1 = 422$, $n_2 = 174$; Model 3b: $n_1 = 423$ $n_2 = 173$; 95% confidence intervals in parentheses; *$p < .05$; **$p < .01$; ***$p < .001$.

Abbreviations: AIC, Akaike information criterion; BIC, Bayesian information criterion; Dev, −2 × Log Likelihood (LL) of the model.

TABLE 4 Results of the multilevel models for change on job satisfaction across time and conditions and significant moderators

		Model 1 Unconditional growth model			Model 2 Conditional growth model (cross-level interaction)			Model 3a Conditional growth model (treatment and moderator)			Model 3b Conditional growth model (treatment and moderator)		
Fixed effects		***B***	***SE B***	***t***	***B***	***SE B***		***B***	***SE B***	***t***	***B***	***SE B***	***t***
Intercept	γ_{00}	4.71	0.08	56.28***	4.73	0.12	40.90***	4.74	0.12	39.85***	4.75	0.12	41.21***
Treatment	γ_{01}				−0.05	0.17	−1.00	−0.05	0.17	−0.26	−0.02	0.17	−0.14
Time	γ_{10}	−0.05	0.04	−1.13	−0.06	0.06	−0.32	−0.07	0.06	−1.09	−0.08	0.06	−1.26
Diversion	γ_{02}							−0.23	0.14	−1.66			
Optimism	γ_{02}										−0.03	0.05	−0.60
Time × Treatment	γ_{11}				0.02	0.09	0.25	0.02	0.09	0.26	0.04	0.09	0.45
Time × Diversion	γ_{12}							0.23	0.07	3.40***			
Time × Optimism	γ_{12}										0.07	0.03	2.46**
Treatment × Diversion	γ_{03}							0.37	0.19	1.89†			
Treatment × Optimism	γ_{03}										0.23	0.07	3.18***
Time × Treatment × Diversion	γ_{13}							−0.23	0.10	−2.31*			
Time × Treatment × Optimism	γ_{13}										−0.10	0.04	−2.49***
Random effects													
Intercept	σ^2_0	0.75	[0.57–1.00]		0.75	[0.57–1.00]		0.78	[0.59–1.00]		0.67	[0.50–0.90]	
Residual	$\sigma^2\varepsilon$	0.58	[0.49–0.68]		0.58	[0.49–0.68]		0.56	[0.47–0.66]		0.57	[0.48–0.67]	
Model fit		Dev	AIC	BIC	Dev	AIC	BIC	Dev	AIC	BIC	Dev	AIC	BIC
		1336.2	1344.2	1360.8	1336.1	1348.1	1373.0	1293.3	1313.3	1354.6	1271.7	1291.7	1332.9

Note: Not $n_1 = 469$, $n_2 = 184$; Model 3a: $n_1 = 422$, $n_2 = 174$; Model 3b: $n_1 = 454$, $n_2 = 177$; 95% confidence intervals in parentheses; $^*p < .05$; $^{**}p < .01$; $^{***}p < .001$; $^\dagger p < .07$.
Abbreviations: AIC, Akaike information criterion; BIC, Bayesian information criterion; Dev, −2 × Log Likelihood (LL) of the model.

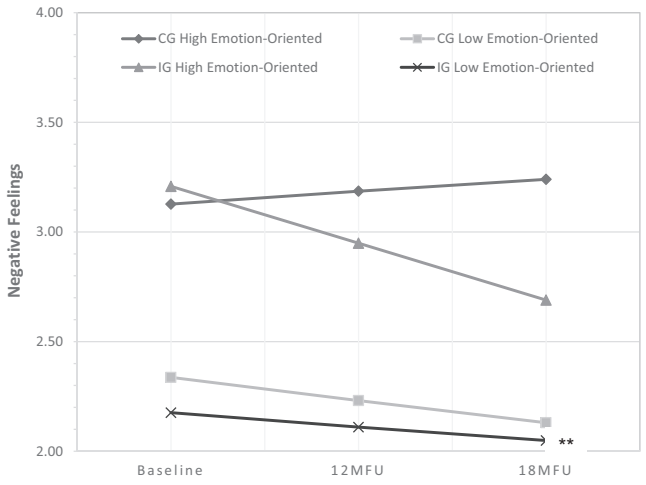

FIGURE 4 Moderating effect of emotion-oriented coping on changes in negative feelings for CG and IG. Note. $^{**}p < .01$; the scale of the *y*-axis starts with 2.0 and ends with 4.0

of the variance (Nagelkerke's pseudo-R^2 statistics). According to the simple slopes analyses, levels of an emotion-oriented coping style predicted a decrease in negative feelings over time for participants in the IG ($b = -0.08$, $t(253) = -2.50$, $p = .013$; Figure 4). All other simple slopes were not significant. Post hoc contrast analyses revealed significant mean differences between the CG and the IG from T0 to T1 ($\chi^2(1) = 11.51$, $p < .001$), and from T0 to T2 ($\chi^2(1) = 12.19$, $p < .001$) for high emotion-oriented scores. Effect sizes for T0 to T1 were Cohen's $d = 0.14$ in the CG, and $d = 0.64$ in the IG, which correspond to small (CG) and medium (IG) effects.

Next, we evaluated whether optimism or pessimism had a moderating effect on different aspects of subjective well-being in the IG compared with the CG. For pessimism, we found no significant moderator effect on all five evaluated aspects of well-being. However, we found that dispositional optimism moderated the effect of treatment condition on changes in negative feelings ($b = 0.07$, $SE = 0.024$, $p = .003$; Table 2). This model explained 55% of the variance (Nagelkerke's pseudo-R^2 statistics). According to the simple slopes analyses, lower levels of optimism 1 *SD* below the mean predicted a decrease in negative feelings for participants in the IG ($b = -0.23$, $t(244) = -2.41$, $p = .017$). For the CG, higher levels of optimism predicted a decrease in negative feelings ($b = -0.12$, $t(244) = -4.01$, $p < .001$). All other simple slopes did not significantly differ from 0 (Figure 5). Post hoc contrast analyses revealed significant mean differences between the CG and the IG from T0 to T1 ($\chi^2(1) = 8.64$, $p < .01$), and from T0 to T2 ($\chi^2(1) = 14.77$, $p < .001$) for low optimism values. Cohen's *d* for T0 to T1 was $d = 0.02$ in the CG, and $d = 0.48$ in the IG, which correspond to small effects.

We also found that dispositional optimism moderated the effect of treatment condition on changes in job satisfaction ($b = -0.10$, $SE = 0.040$, $p = .014$; Table 2). Simple slopes analyses revealed that no simple slopes significantly differed from 0 (Figure 6). In terms of within-group effects, post hoc contrast analyses detected no significant differences between the CG and the IG for the different measurement points in relation to levels of optimism.

4 | DISCUSSION

In this study, we conducted exploratory analyses to examine moderators of treatment outcome of an RCT in which a combination of conventional case management and highly tailored counselling was compared with conventional case management only. The results of these analyses revealed that dispositional optimism and the emotion-oriented and social diversion coping styles moderated the treatment efficacy of three different aspects of well-being, namely life satisfaction, job satisfaction and negative feelings.

4.1 | Social diversion

Concerning the coping style social conversion, we found that participants in the IG with low levels of social diversion showed improvements in life satisfaction, whereas participants in the CG showed a statistical trend ($p = .07$) towards decreased life satisfaction. Further inspection of the interaction plots revealed a stable trajectory for participants with high levels of social diversion regardless of the experimental condition. We also found that participants in the CG with low levels of social diversion showed a significant decrease in job satisfaction over time.

Seeking social distraction through a supportive, emphatic social network could be a feasible way to cope with distress (Folkman, 2013; Folkman et al., 1986; Tough et al., 2017; Zinman et al., 2014). Our intervention, which explicitly targeted resource activation, that is, a focus on strengths and potentials of participants, might have contributed to the discovery and use of their available social resources (Flückiger et al., 2010). Accordingly, the social distraction that a person's social network can provide could be seen as a reactivated personal resource for seeking and activating social support (Hatchett & Park, 2004). This activated and perceived social support may in turn have led to the observed improvement in life satisfaction and buffering of the decrease in job satisfaction. This post hoc explanation is in line with numerous findings on the preventative effect of social support on health-related quality of life and well-being for individuals with health-related adversities (Brands et al., 2014; Kendrick, Kelllezi, et al., 2017; Livneh & Martz, 2014; Tough et al., 2017). In the same manner, research has shown that coping skills of injured persons can change over the course of a cognitive behavioural-oriented treatment (e.g. Anson & Ponsford, 2006). Zinman et al. (2014) even report an increase in the use of the social diversion coping style after an outpatient reintegration programme for people with spinal cord injury.

Our findings may have implications for clinical practice, since the results suggest that an intervention including resource activation and goal-oriented attempts to foster social resources may help in reducing

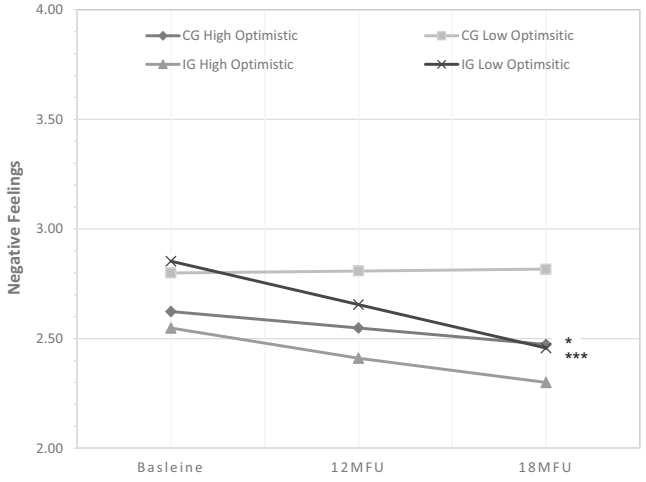

FIGURE 5 Moderating effect of dispositional optimism on changes in negative feelings for CG and IG. Note. ***$p < .001$; *$p < .05$; the scale of the y-axis starts with 2.0 and ends with 4.0.

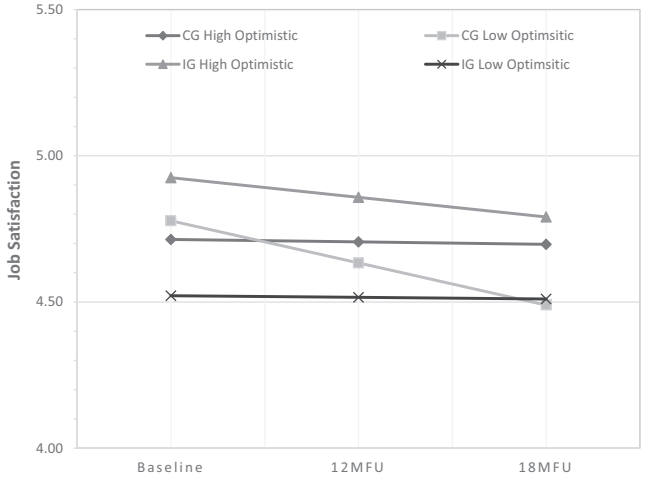

FIGURE 6 Moderating effect of dispositional optimism on changes in job satisfaction for CG and IG. Note. The scale of the *y*-axis starts with 4.0 and ends with 5.5

the extent to which physical injury results in decreased psychological well-being.

4.2 | Emotion-oriented coping

Concerning emotion-oriented coping, we found that participants in the IG with low levels of emotion-oriented coping showed a decrease in negative feelings. Moreover, post hoc contrast analyses revealed that IG participants with high levels of emotion-oriented coping showed lesser negative feelings at both the post- and the follow-up assessment compared to CG participants with high levels of emotion-oriented coping (Figure 4). Participants in the CG with high emotion-oriented coping even showed a statistical trend towards an increase in negative feelings over time.

Emotion-oriented coping is focused on the reduction and management of the intensity of distressing emotions elicited by an adverse event (Folkman et al., 1986). Emotion-oriented coping strategies are mostly seen as a short-term adaptive alternative to other coping styles, for example if emotional responses are too intense to solve a problem or if a situation cannot be changed and goal-oriented coping therefore is not possible (Folkman et al., 1986). Even though emotion-oriented coping does not have to be exclusively maladaptive, it does not solve the source of the emotional distress. Thus, offering counselling to injured workers who use emotion-oriented coping might help guide them towards more positive and helpful forms of emotion-oriented coping. We assume that the counselled participants have learned more flexible ways of coping, including emotion-oriented coping. Indeed, a closer inspection of the treatment plans for the counselled participants revealed that the development of adaptive coping strategies and their flexible use was explicitly stated as the main treatment goal in most cases. This assumption is in line with several findings on cognitive behavioural-oriented interventions, which were shown to be effective in increasing adaptive coping strategies (e.g. Anson & Ponsford, 2006; Hanks et al., 2012; Zinman et al., 2014).

Our findings may have implications for clinical practice. To support the post-injury adjustment process, it may be beneficial to help individuals build a broader coping repertoire and encourage a more flexible use of adaptive coping styles. Thus, psychoeducation regarding different coping styles, establishing the promotion of adaptive coping styles as an explicit therapeutic goal, and compatible cognitive behavioural therapeutic interventions could be feasible first steps to improve the experience of self-efficacy in injured workers. Additionally, screening for emotion-oriented coping, and, if present, guiding patients towards adaptive, positive emotion-oriented coping might be helpful.

4.3 | Dispositional optimism

Finally, we found that IG participants with low levels of dispositional optimism, and CG participants with high levels of dispositional optimism both showed a significant decrease in negative feelings. Moreover, post hoc contrast analyses revealed significant between-group differences for people with low levels of dispositional optimism: IG participants with low levels of optimism showed fewer negative feelings at the post- and the follow-up assessment than CG participants with low levels of optimism (Figure 5).

This difference may suggest that the intervention was able to compensate for the lack of optimism. In line with this assumption, Carver and colleagues (Carver & Scheier, 2014; Carver et al., 2010) have postulated cognitive restructuring techniques contribute to the establishment of a more optimistic view in psychotherapy settings. A closer look at the counselling techniques used in our intervention revealed that all counsellors applied cognitive restructuring techniques. Thus, challenging irrational and maladaptive beliefs and introducing more adaptive thinking patterns might be helpful in supporting post-injury adjustment processes. Also, these results

point to a confirmation of the findings of previous studies whereby optimism has a positive effect on different aspects of well-being in individuals facing health-related adversities (Carver et al., 2010; Skogstad et al., 2014; Vassend et al., 2011).

4.4 | Limitations and strengths

One limitation of our study is that we found only a few differential treatment effects. Of the seven potential moderator variables, only three contributed significantly to the explanation of variance in our models. This may be partly due to the rather small sample of 192 participants and the resulting limited statistical power. Although our sample was larger than that of other rehabilitation studies (e.g. Giummarra et al., 2018; Stamenova & Levine, 2019; Tornås et al., 2019), it was still rather modest considering that we conducted moderation analyses in a multilevel setting. Therefore, our results should be considered as hypothesis-generating findings that can be further investigated in future studies.

A strength of this study is its high methodologic quality, as it met several Cochrane collaboration criteria including randomisation concealment, using an intention-to-treat principle, a loss to follow-up <50%, and a trial assessor who was blinded from the data collection process. Moreover, the study was monitored by an external assessment centre, and we employed a long follow-up period of one and a half years post-injury. In contrast to previous rehabilitation intervention studies (e.g. Giummarra et al., 2018; Guest et al., 2015; De Silva et al., 2009), we applied more robust statistical methods, which takes the hierarchical structure in the data into consideration and improves the handling of missing data (Singer & Willett, 2003; Tasca & Gallop, 2009).

Finally, our findings add to the growing evidence that low-threshold interventions for injured persons may be useful in preventing psychological sequelae. Additionally, we found support for the importance of considering the interaction between participant characteristics and treatment for the prediction of outcomes. Our findings suggest that pretreatment coping abilities and dispositional optimism may help predict which individuals will benefit most from counselling. Such predisposing factors should be assessed through screening and incorporated in treatment plans. However, further RCTs are needed to replicate our findings and to investigate possible mechanisms of patient characteristics on treatment efficacy in injury rehabilitation.

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CONFLICT OF INTEREST

The authors report no conflict of interest.

AUTHOR CONTRIBUTIONS

HJZ, VS and UHR conceptualised the study. HJZ, VS and UHR recruited the participants. VS and HJZ supervised the interventions. SA performed data collection and analysis. SA, HJZ and JH interpreted the analyses. SA and JH drafted the manuscript. All authors contributed equally to the final methodology and significantly contributed to the writing of the manuscript.

ETHICAL APPROVAL

All procedures from this investigation followed the Helsinki Declaration, and all researchers complied with the Swiss Law for Human Research. Ethics approval was obtained from the Ethics Committee of the University of Bern (No. 2011-04-172).

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