



Care for Joy: Evaluation of a Humor Intervention and Its Effects on Stress, Flow Experience, Work Enjoyment, and Meaningfulness of Work

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The media increasingly speak of a care crisis. Systematic support is needed to prepare nursing apprentices for the high demands of their profession and to reduce the number of nurses who finally quit. Particularly in stressful jobs like nursing, humor as a coping strategy can have a beneficial effect on perceived stress and overall work enjoyment. In this study, we used a humor intervention among nursing staff in training and evaluated its effects on humor, stress, work enjoyment, the meaningfulness of work, and flow experience. The sample consists of 104 nurses in training. The intervention group received a 3-h humor intervention, while the control group received no intervention. Positive and negative affect were measured immediately before and after the intervention. Humor was measured before the intervention (t_0) and again 6 months later (t_1); at t_1 , we again measured humor and also stress, work meaningfulness, work enjoyment, and flow experience. Our analyses showed a beneficial change in positive and negative affect right after the intervention. By means of repeated measures ANOVA we could further confirm an effect of the intervention on reported humor 6 months later. Humor mediated positive effects of the humor intervention on perceived meaningfulness of work, work enjoyment, and on the frequency of flow at work. Also, we found a significant negative relationship between humor and stress measured at t_1 . The results of this study confirm the effectiveness of humor interventions in promoting humor, and, through this, the meaningfulness of work, work enjoyment, and the frequency of flow experience. Implications of the use of humor interventions in the nursing profession are discussed.

Keywords: humor, intervention, stress, flow experience, work enjoyment, meaningfulness of work, nurse

INTRODUCTION

Media often speak of a care crisis. Due to demographic change and medical progress, a considerable shortage of skilled workers in the nursing profession is predicted for the future (1–3). Reasons for this are the increasing age of the patients and the increasing age of the nurses themselves; also, it is expected that fewer young nurses will enter the profession in the future (4). We further know that nursing staff are under great physical and psychological strain in their profession, and there

has been an increase in absenteeism and the intention to terminate (5). Accordingly, there is a need for action regarding the working conditions of nursing staff to make the profession more attractive for young nurses and to reduce fluctuations. In particular, the increased number of terminations by nurses can have extensive consequences, such as high economic costs, reduced well-being of the remaining nurses or lower satisfaction with care from the patient's perspective (6). Experienced stress at work can be a reason for termination intentions (7, 8), and also for burnout among nurses (9). Not only does burnout negatively impact health among nurses (10), but patients also show higher satisfaction with care when nurses report lower burnout levels (11). Accordingly, there is a need for interventions that help nurses to cope with their work-related stress (12, 13). Research has identified the use of humor as a promising strategy to deal with stress (14–18). The aim of our study is, thus, to evaluate the effectiveness of a humor intervention for nurses in training. More specifically, we look at the effects of the intervention on sense of humor, and, in consequence, on work experience, including perceived stress, work enjoyment, frequency of flow experience, and perceived meaningfulness of work as mediated by one's sense of humor. The humor intervention was conducted with nurses in training and their results were compared to a control group without intervention.

Humor

The construct of humor has been described in the field of Positive Psychology (19) and is a very complex, multidimensional phenomenon. There are various approaches to its definition and classification (20). One such approach was that of Martin (21), according to whom humor is a process with cognitive, emotional, and interpersonal aspects (21); it can be defined as

“... a broad term that refers to anything that people say or do that is perceived as funny and tends to make others laugh, as well as the mental processes that go into both creating and perceiving such an amusing stimulus, and also the affective response involved in the enjoyment of it. From a psychological perspective, the humor process can be divided into four essential components: (1) a social context, (2) a cognitive-perceptual process, (3) an emotional response, and (4) the vocal-behavioral expression of laughter.” [(21), p. 5].

In our study we refer to the sense of humor: this refers to the habit of laughing at humor and using humor more often than the average person (22–24). Sense of humor is defined as:

“... a habitual behavior pattern (tendency to laugh frequently, to tell jokes and amuse others, to laugh at other people's jokes), an ability (ability to create humor, to amuse others, to “get the joke,” to remember jokes), a temperamental trait (habitual cheerfulness), an aesthetic response (enjoyment of particular types of humorous material), an attitude (positive attitude toward humor and humorous people), a world view (bemused outlook on life), or a coping strategy (tendency to maintain a humorous perspective in the face of adversity).” [(25), p. 315].

We find humor not only as an independent construct, but also in other concepts of Positive Psychology, such as character strengths (19, 26, 27). Character strengths are morally valued aspects of one's personality. Examples are creativity, wisdom, kindness, bravery, modesty, and many more, including humor (26). Character strengths are described as relatively stable, but they can also be changed. The definition of sense of humor shows similarities to the definition of humor as a character strength (26), and their positive relationship was confirmed in an empirical study that found correlations between the two (28).

Sense of humor is divided into six different sense of humor habits, which can be described as enjoyment of humor, laughter, verbal humor, finding humor in everyday life, laughing at yourself, and humor under stress (17, 29). The six sense of humor habits together represent a total value of the sense of humor, but this should not only be seen as a one-factor model; rather, the six different sense of humor habits each provide unique information and should, thus, also be individually reported (30).

Humor has many functions within and between persons in the work context (20). For example, humor has an important function in communication (31) and it can increase well-being (32–35) and positive affect (32, 36, 37). Also, humor has relationships between $r = 0.23$ and $r = 0.43$ with each element of the PERMA Model (38). The PERMA Model (39) describes five pillars of well-being, which are: “positive emotions,” “engagement,” “positive relationships,” “meaning,” and “accomplishment” (39). Building upon the positive relationship between humor, positive emotions and well-being, including the five pillars of the PERMA model, research has found that humor can function as a coping strategy in dealing with stress (25, 40, 41). Increased well-being is associated with greater resilience and, thus, can act as a protective factor against stress (42). Also, the positive emotions elicited by humor in the moment are not compatible with stress, which supports a re-framing of the situation and successful coping (40).

Humor in the Care Context

Humor as a form of communication is a helpful tool for patient-centered care (43). For example, humor can be used to build and maintain a relationship (44). Literature suggests that humor improves the understanding of therapeutic concepts and leads to a higher acceptance and therapy adherence; this further results in reduced challenges for the care givers (45). Use of humor by nurses is interpreted by patients as a positive characteristic of a nurse and is also an important aspect of patient/nurse interaction (46). Humor in the nursing context improves communication and also increases trust between nurse and patient (47, 48). Humor can also create a sense of cohesion not only between patients and nurses, but also among colleagues. Further, humor helps one to deal with difficult situations and difficult patients (49). A literature review looked at the positive aspects of humor in healthcare and concluded that nurses should be aware of their own humor and use it to interact with patients (50). In general, patients' anxiety can be reduced through the use of humor (47, 51); at the same time, patients feel supported by humorous nursing interventions with regard to their health and the healing process (47). The use of humor in the nursing

profession is a complex nursing intervention that requires a lot of creative energy and also cognitive skills in the interaction between patients and nurses (47, 48). It is recommended that the use of humor as a nursing intervention should be tailored to the individual patient (48); also, the right timing of the use of humor is important (52).

Due to the complexity of nursing interventions, special training for the use of humor in the nursing context should be conducted (48). For this reason, the humor training program “Care for Joy” for nurses in training has been developed. It is designed to prepare nursing staff in training for the reported high stress of their profession. This study deals with the first module of the “Care for Joy” training. We aim to examine the effects of this first module on sense of humor and the corresponding six sense of humor habits (17) in an intervention group as compared to a control group.

Humor Training

To use the full potential of humor in the health care context, humor trainings are promising interventions. Importantly, sense of humor is not stable over time and is considered changeable (41). Studies show that sense of humor can be trained and developed (53–55). An already known training program “The 7 Humor Habits Program” was developed by McGhee (17) and provides the basis for a further practical training for psychiatric-psychotherapeutic practice, which is also suitable for healthy individuals (53). “The 7 Humor Habits Program” aims to build and strengthen humor in everyday life as a skill for successful stress management (17). The effectiveness of humor training like “The 7 Humor Habits Program” has already been confirmed in studies. For example, it has been shown that humor training increases sense of humor, self-efficacy, positive thinking, optimism, and happiness, and decreases negative thinking, depression, anxiety, and stress (33, 54–56).

Humor Training in the Care Context

While humor trainings have been successfully tested in the field, there is still a lack of profession-specific humor trainings in the care context. For example, “The 7 Humor Habits Program” is not designed for a specific group of participants, but for all those who have forgotten to use humor in everyday life and have lost their playful attitude in life (17). Due to the complexity of humor in the care context, caregivers should receive systematic support in the form of training (48), which takes into account job-specific situations, such as contact with patients in difficult circumstances. In order to develop the sense of humor for nurses in training, we have therefore created a humor training for this specific target group. The training and the individual humor interventions have been developed with a problem-based approach. Problem-based training has its origin in medical school and is characterized by the fact that learning is an active process with direct reference to problems in practice (57). It has been shown that learning is facilitated by using problem-based methods (57); at the same time, problem-based training shows the learners how they can apply what they have learned in practice (58)—a key factor for successful transfer after training. Also a meta-analysis shows that problem-based

training has positive effects on the acquisition of skills, i.e., the application of knowledge (59). Based on this, and based on the above mentioned studies that show that the sense of humor can be trained (33, 54, 55), we assume that our humor intervention increases the sense of humor and the six sense of humor habits.

Hypothesis 1: The humor intervention has a positive effect on the nurses’ sense of humor and on the six sense of humor habits.

Perceived Stress

A well-known stress model is the *transactional model of stress and coping* (60), which is based on a primary assessment of a stressor and classifies this stressor as positive, negative or irrelevant. A negatively assessed stressor is subjected to a secondary assessment, in which resources are compared with the demands of the stressor. Lack of resources can lead to stress (60). In the *transactional model of stress and coping* (60), humor can act as a coping strategy through cognitive appraisal and subsequent behavior (61). Stress-based emotions and stressful person-environment relations can be regulated by humor. This was shown in a qualitative study in which nurses in training used humor as a coping strategy to cope with stressful person-environment relations (e.g., dealing with patients who violate social norms) and to achieve positive affect as an outcome (61). Even in extraordinary times such as the COVID-19 pandemic, humor has been shown to be an effective coping strategy (62) and this was also found for nurses (63, 64). People with a greater sense of humor can manage stress more effectively (16). A review article on humor in medicine concludes that humor can reduce stress in medical professionals and patients (14). Humor creates positive emotions that are incompatible with stress and that thus facilitate coping (40). Especially in stressful occupations such as nursing, humor as a coping strategy can have a positive effect on the perceived stress level (14–17, 61). Therefore, increases in the sense of humor due to our humor intervention should translate into reduced levels of perceived stress.

Hypothesis 2: An increased sense of humor mediates negative effects of the humor intervention on perceived stress.

Work Enjoyment During Practical Training

The training of nurses alternates between phases of theoretical and practical training. Work enjoyment during practical training can be defined as “... the degree to which individuals work because they find the work itself intrinsically interesting or pleasurable” [Johnstone and Johnston, 2005; McMillan et al., 2002; Spence and Robbins, 1992 as cited in (65), p. 1656]. One important reason why nurses enjoy their work is because they enjoy interacting with and caring for patients, which is at the same time one reason why they stay in the nursing profession (66). Studies show that humor has an impact on positive affect (32, 36, 37, 67). There are strong links between the concepts of work enjoyment, positive affect and job satisfaction (68–70), and work enjoyment has even been used as a dimension in the assessment of job satisfaction [MOAQ (71)]. A meta-analysis shows that humor is associated with job satisfaction (72) and further that day-related job satisfaction can predict humor production the following day (73). By implementing humor in the work context, work enjoyment should thus increase (74). This

relationship has not yet been shown, however, in the context of health care workers. Therefore, we aim to test if the increase of sense of humor caused by the humor intervention will lead to increased work enjoyment.

Hypothesis 3: Sense of humor mediates a positive effect of the humor intervention on work enjoyment.

Flow Experience

Flow is described as a pleasant and rewarding state of full absorption during the performance of activities, and it is facilitated clear feedback, clear goals and a balance of demands and abilities (75). Flow can also be assigned to the *PERMA Model* (39), under the pillar of engagement (39, 76).

Flow promotes well-being (77–81) and performance (79, 82–84). Like humor (61), the *transactional model of stress and coping* (60) can also be associated with flow (85). In interview studies, the constructs of fun at work and flow experience were implemented into a theoretical framework; in those studies, fun at work was described as flow-promoting (86, 87). In a quantitative study, a correlation between flow and humor could also be shown (88). In line with this, self-reported humor and the element “engagement” from the *PERMA Model* have been shown to correlate (38). To the best of our knowledge, there are no other studies that have investigated the direct relationship between sense of humor and flow.

Studies show that flow is positively associated with positive affect (89–91) and negatively associated with negative affect (89). Fun is described as a factor that can promote flow in everyday work (87, 92). Also, it was found that having previous positive affect was a significant predictor of increased flow (93). As humor promotes positive affect (32, 36, 37, 67), promoting the sense of humor should positively affect flow-experience (87, 89, 91–93). Based on this assumption, we propose in hypothesis 4 that sense of humor can be increased by our humor intervention and that sense of humor acts as a mediator to increase the frequency of flow experience at work.

Hypothesis 4: Sense of humor mediates a positive effect of the humor intervention on flow frequency.

Perceived Meaningfulness of Work

In the *Job-Characteristics Model* (94) the perceived meaningfulness of work is defined as “The degree to which the individual experiences the job as one which is generally meaningful, valuable and worthwhile” [(94), p. 256]. Whether or not work is considered meaningful is the result of an individual’s subjective assessment (95). Various factors affect the perceived meaningfulness of work, which are the self, others, the work and its context, and spiritual life (95). The term “meaning” is associated with the identity of individuals and thus also with one’s own work (96). Accordingly, we understand meaningful work in the nursing profession as a subjective assessment of the general meaningfulness of the work, the importance of the work for one’s own identity, and the significance of the work for others and for society as a whole.

Employees who consider their work to be meaningful feel better at work, report fewer signs of depressive moods, feel needed at work and at the same time feel part of a group

(97). The perceived importance of work has a positive effect on well-being (97–99). In a study with nurses, it was found that the nursing profession is perceived as meaningful and that this perception helps to deal with difficult challenges in the work environment. Also, nurses who evaluate their work as meaningful are less dependent on positive feedback regarding their work from patients or their relatives (100).

Humor as a component of character strengths is assigned to the category of transcendence strengths, which are defined as “strengths that (...) provide meaning” [(26), p. 30]. According to this definition, humor should also be able to provide meaning. To the best of our knowledge, there are no studies yet that investigate the effects of humor on the perceived meaningfulness of work. Based on the assumption that humor can generate meaning, we derive the hypothesis that our humor intervention enhances the perceived meaningfulness of work as mediated by an increased sense of humor.

Hypothesis 5: Sense of humor mediates a positive effect of the humor intervention on the perceived meaningfulness of work.

Summary of our Hypotheses

In sum, we examine the long-term effects of the humor intervention on the sense of humor and its six sense of humor habits (*hypothesis 1*), and the resulting effects on perceived stress (*hypothesis 2*), work enjoyment (*hypothesis 3*), the frequency of flow experience (*hypothesis 4*), and perceived meaningfulness of work (*hypothesis 5*).

To test these hypotheses, we conducted a humor intervention with nurses in training (intervention group) while a comparable control group received no intervention. We measured sense of humor before and 6 months after the humor intervention to test our hypothesis of whether the humor intervention has long-term effects on sense of humor and the six sense of humor habits. We also examined if the increased sense of humor (as a mediator) translates into reduced stress, and increased work enjoyment, frequency of flow experience, and perceived meaningfulness of work.

Further Evaluation of the Humor Intervention

In addition to testing the above described hypotheses, we evaluated the reactions of the participants to the humor intervention with regard to their attitudes toward the humor intervention, their subjective enjoyment during the humor intervention, the perceived usefulness for their work, and the perceived difficulty of the humor intervention. We also investigated the immediate effects of the humor intervention on our participants’ positive and negative affect directly before compared to directly after the intervention. Furthermore, we examined if the acute change in positive affect and negative affect due to the humor intervention was related to the sense of humor and its subscales as well as on perceived stress, work enjoyment, frequency of flow experience, and perceived meaningfulness of work at t_1 .

METHODS

Participants and Design

The participants were nurses in training who received a 3-h humor intervention [intervention group (IG)] or no intervention [control group (CG)]. In contrast to the IG, the CG did not receive any intervention. Data collection took place at two different nursing schools of the same health care provider, so that for both groups, the schools' curriculum is identical. The sample was composed of nurses in training of the same cohort and in the same year of training.

The participants completed questionnaires a few days before the training (t_0) and 6 months later (t_1) to evaluate longterm effects of our intervention. The control group completed the same questionnaires in the same period of time. The sample consists at t_0 in total of $N = 104$ (85 females, 18 males, 1 not reported, $M_{age} = 19.96$, $SD_{age} = 2.563$), of which $N_{IGt1} = 71$ belonged to the intervention group (63 females, 7 males, 1 not reported, $M_{age} = 19.77$, $SD_{age} = 1.578$) and $N_{CGt0} = 33$ belonged to the control group (22 females, 11 males, $M_{age} = 20.38$, $SD_{age} = 3.966$). At t_1 , the sample consisted of $N_{t1} = 94$ (74 females, 20 males, $M_{age} = 21.06$, $SD_{age} = 3.144$), of which $N_{IGt1} = 63$ belonged to the intervention group (53 females, 10 males, $M_{age} = 20.85$, $SD_{age} = 2.708$) and $N_{CGt1} = 31$ belonged to the control group (21 females, 10 males, $M_{age} = 21.59$, $SD_{age} = 4.031$). For an overview of the sample, see **Table 1**.

Procedure

A few days before the humor intervention took place, all participants (IG + CG) completed a questionnaire that assessed their sense of humor baseline (t_0) including the six sense of humor subscales. Six months after the intervention (t_1) we measured again in both groups the sense of humor as well as the perceived stress, work enjoyment, frequency of flow experience, and meaningfulness of work. The intervention group additionally completed short questionnaires immediately before (t_0) and after the training (t_{11}) to assess changes in positive (*SPANE-P*) and negative affect (*SPANE-N*). For t_{11} we additionally measured questions to evaluate the humor intervention with the "Training Evaluation Inventory (TEI)" (Level 1: reactions and Level 2: learning and attitude). An overview of the measurement points and the study variables can be seen in **Figure 1**. Our study was approved by the local ethics committee at the Ruhr University Bochum, Germany.

Humor Intervention

The humor intervention addresses humor and communication techniques to create a positive relationship with the patient, the patient's relatives as well as with colleagues. It combines practical exercises (e.g., emotion recognition) with subsequent theoretical input, and then reflects on how to translate the learnings into practice. The intervention aims at sensitizing the participants to recognize individual situations of patients in order to then adequately respond to them. The exercises are inspired by scientifically validated exercises on communication and emotion recognition and by positive psychological interventions (e.g., giving compliments) in combination with clown techniques and

exercises from the field of theater. The humor intervention was conducted in a 3-h session in a classroom at the nursing school. The training that we used had been developed 6 years prior by the foundation "Humor Hilft Heilen" (Humor Helps Healing) and has been conducted with over 10,000 participants from health care. Also, this training has already been conducted in nursing schools for 3 years. The training is given by humor trainers of the foundation "Humor Hilft Heilen" (Humor Helps Healing). Further modules were developed for the "Care for Joy" project, which are carried out at 6-month intervals over a period of 3 years. As only the evaluation of the first module has been completed so far, the further developed modules are not the subject of this evaluation. The control group did not receive the humor intervention. In terms of content, the humor intervention defined humor and taught basic humorous communication skills in the context of the nursing profession. Also, positive aspects of the nursing profession were identified and the relevance of the nursing profession was worked out. The communication techniques were practiced in group exercises to facilitate the transfer into practice. In order to further consolidate the transfer into practice, the intervention group was given a "homework" exercise on positive patient communication for the training phase.

Study Variables

Sense of Humor

To measure sense of humor, we used the *Sense of Humor Scale* [*SHS*, (17)] combined with the *Sense of Humor Scale parallel form* [*SHS-P* (30)] as recommended by Ruch and Heintz (30). Sense of humor showed a very good Cronbach's Alpha at both measuring times ($t_0 = 0.94$ and $t_1 = 0.94$). Sense of humor consists of the six subscales of *SHS* and *SHS-P* with a total of 48 items. Each of the six subscales contains a total of eight items. The subscales are *enjoyment of humor* (Cronbach's Alpha: $t_0 = 0.74$ and $t_1 = 0.71$; example item: "I enjoy funny sketches"), *laughter* (Cronbach's Alpha: $t_0 = 0.79$ and $t_1 = 0.82$; example item: "I feel comfortable laughing, even when others aren't"), *verbal humor* (Cronbach's Alpha: $t_0 = 0.85$ and $t_1 = 0.85$; example item: "I often make funny comments"), *finding humor in everyday life* (Cronbach's Alpha: $t_0 = 0.87$ and $t_1 = 0.85$; example item: "I can get something funny out of a lot of activities"), *laughing at yourself* (Cronbach's Alpha: $t_0 = 0.83$ and $t_1 = 0.85$; example item: "I find it easy to laugh when I am the butt of the joke") and *humor under stress* (Cronbach's Alpha: $t_0 = 0.89$ and $t_1 = 0.90$; example item: "My sense of humor is for me a good way to cope with stress"). The items were measured on a 7-point-Likert scale from (1) "strong disapproval" to (7) "strong agreement."

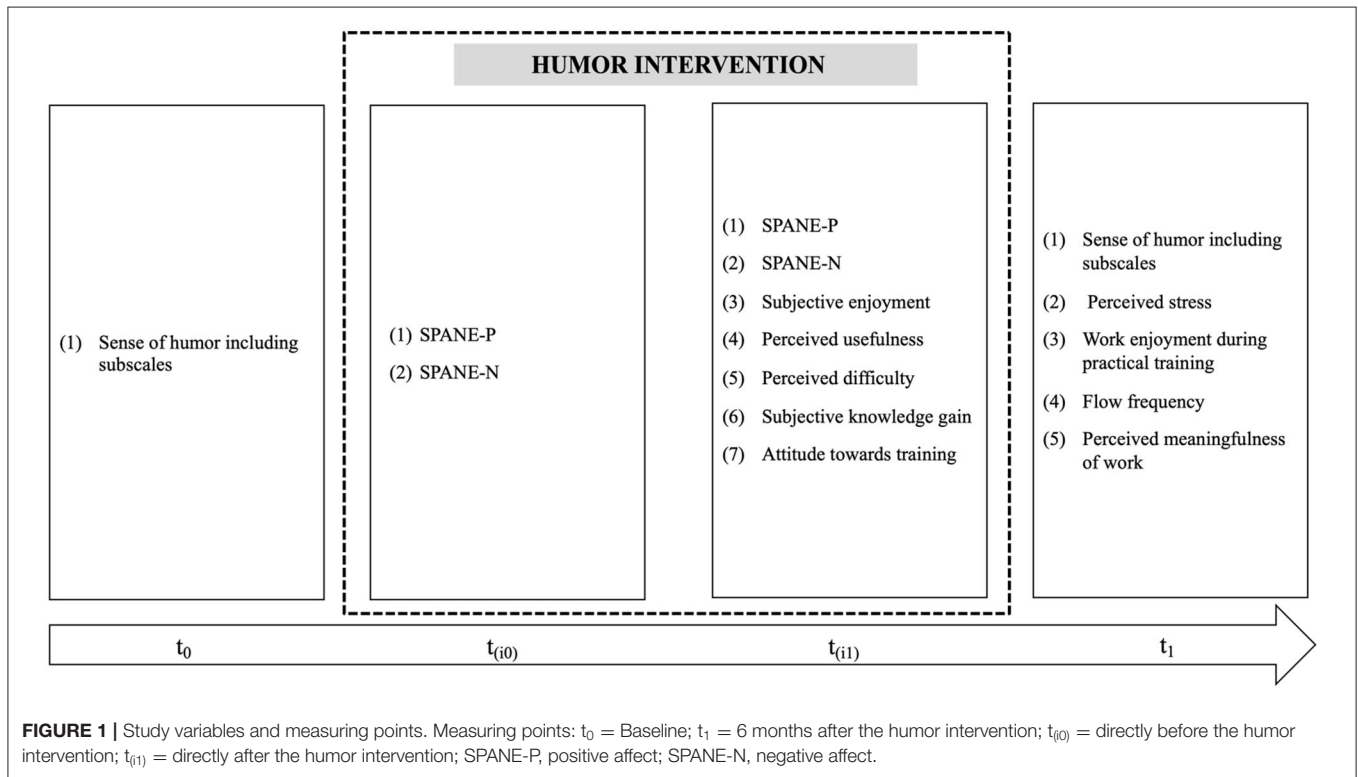
Perceived Stress

Perceived stress was measured with the *Perceived Stress Scale Questionnaire* (*PSQ*) by Fliege et al. (101). The *PSQ* (Cronbach's Alpha: $t_1 = 0.85$) consists of a total of 20 items, which are divided into four subscales. The subscales of the *PSQ* are *tension*, *joy* (with inverted items), *worries* and *demands*. An example item of the *PSQ* is "You feel under pressure from deadlines." The items were measured on a 4-point-Likert scale from (1) "almost never," (2) "sometimes," (3) "frequently" to (4) "most often."

TABLE 1 | Overview sample at t_0 and t_1 (N and mean and standard deviation of age).

Measuring points	Overall sample	Control group (CG)	Intervention group (IG)
Measuring point t_0	$N = 104$, $M_{age} = 19.96$, $SD_{age} = 2.563$	$N_{(CG)} = 33$, $M_{age(CG)} = 20.38$, $SD_{age(CG)} = 3.966$	$N_{(IG)} = 71$, $M_{age(IG)} = 19.77$, $SD_{age(IG)} = 1.578$
Measuring point t_1	$N = 94$, $M_{age} = 21.06$, $SD_{age} = 3.144$	$N_{(CG)} = 31$, $M_{age(CG)} = 21.59$, $SD_{age(CG)} = 4.031$	$N_{(IG)} = 63$, $M_{age(IG)} = 20.85$, $SD_{age(IG)} = 2.708$

CG, control group; IG, intervention group; Measuring points: t_0 = Baseline; t_1 = 6 months after the humor intervention.



Participants were instructed to relate their answers to their last 4 weeks at work.

Work Enjoyment

We assessed *work enjoyment* with the items of the subscale “joy” of the *PSQ* by Fliege et al. (101). High values represented more work enjoyment during practical training. The Cronbach’s Alpha of *work enjoyment during practical training* was $t_1 = 0.65$. An example item is “You have fun.”

Frequency of Flow Experience

The *frequency of flow* was assessed with the Flow Frequency Scale Bartzik and Peifer¹ which contains 11 items on a 6-point-Likert scale with (1) “never,” (2) “almost never,” (3) “sometimes,” (4) “often,” (5) “very often,” (6) “(almost) always.” The instructions of the Flow Frequency items were: “Below you will find a number of questions about your daily work experience. Please rate how

often or rarely you have had the experience in the last 2 weeks.” An example item reads: “How often have you experienced in the last 2 weeks at work that you were surprised how quickly time passed.” The Cronbach’s Alpha (t_1) can be described as very good with $\alpha = 0.87$. The scale can be found in **Supplementary Table 1**.

Perceived Meaningfulness of Work

Perceived meaningfulness of work was measured with seven self-generated items, which are measured on a 6-point-Likert scale from (1) “do not agree” to (6) “fully agree” An example item of the perceived importance of the work is “My work is meaningful.” Cronbach’s Alpha (t_1) was very good with $\alpha = 0.85$. The scale can be found in **Supplementary Table 2**.

Positive and Negative Affect

Positive and negative affect were assessed with the *Scale of Positive and Negative Experience (SPANE)* by Diener et al. (102) with a total of 12 items. For the humor intervention we adapted the

¹Bartzik M, Peifer C. Flow Frequency Scale (FFS) (in preparation).

instructions into “Please mark with a cross how you feel now, at this moment, according to the terms listed below.” Positive affect [*SPANE-P*; Cronbach’s Alpha: $t_{(i0)} = 0.87$ and $t_{(i1)} = 0.93$; example item: “positive”) and negative affect [*SPANE-N*; Cronbach’s Alpha: $t_{(i0)} = 0.88$ and $t_{(i1)} = 0.82$; example item: “sad”) were measured with six items each on a 5-point-Likert scale from (1) “not at all,” (3) “neutral” to (5) “very”.

Evaluation of the Humor Intervention

The reactions, learning experiences and attitudes regarding the humor intervention were measured with the Training Evaluation Inventory (TEI) by Ritzmann et al. (103) with 17 items. To evaluate the humor intervention, we used the scales for training outcome dimensions (subjective enjoyment [Cronbach’s Alpha: $t_{(i1)} = 0.85$], perceived usefulness [Cronbach’s Alpha: $t_{(i1)} = 0.85$], perceived difficulty [Cronbach’s Alpha: $t_{(i1)} = 0.83$], subjective knowledge gain [Cronbach’s Alpha: $t_{(i1)} = 0.86$], and attitude toward training [Cronbach’s Alpha: $t_{(i1)} = 0.72$]). The subscales subjective enjoyment (example item: “Learning was fun”), perceived usefulness (example item: “Investing time in this intervention was useful”) and perceived difficulty (example item: “The contents were understandable”) represent level 1 (reactions) and level 2 (learning and attitude) are described with the subscales subjective knowledge gain (example item: “I will be able to remember the new topics well”) and attitude toward training (example item: “I will apply what I have learned in my daily work”). The items were assessed on a 5-point-Likert scale from (1) “does not apply at all” to (5) “fully applies.”

Data Analysis

The data was analyzed using IBM SPSS statistics 26. To test the effectiveness of the intervention over time, we performed a repeated measures ANOVA in which we compared the intervention and control group with respect to their changes in their sense of humor from t_0 to t_1 . The same approach was used with the subscales *enjoyment of humor*, *laughter*, *verbal humor*, *finding humor in everyday life*, *laughing at yourself*, and *humor under stress*. To assess the effect of the intervention on positive and negative affect, we used a paired *t*-test and report the effect size d_z (difference of the mean value of both measuring times divided by the standard deviation). In all analyses, we defined a significance level of $p \leq 0.050$ to report statistically significant results. The mediation hypotheses were tested with the macro PROCESS by Hayes (104). All variables in the mediation models were z-standardized. According to Preacher and Hayes (105), the indirect effect *ab* was estimated to evaluate whether the humor intervention had an indirect effect *via* the sense of humor (t_1) on the hypothesized outcome variables (perceived stress, frequency of flow, and perceived meaningfulness of work). We report a 95% confidence interval ($n_{\text{bootstrap}} = 5,000$) for the indirect effect.

RESULTS

Descriptive Data and Intercorrelations

The descriptive data of the study variables divided into overall, intervention and control group for the measurement times t_0 and

t_1 are presented in Table 2, and the intercorrelations can be taken from Table 3.

Reactions, Subjective Learning Gain, and Attitude Toward the Humor Intervention

The humor intervention for the intervention group ($N_{IG} = 70$) shows descriptive values from $M = 4.00$ to $M = 4.63$ for the different training outcome dimensions, which shows an overall very positive assessment of our intervention by the participants. An overview of the descriptive values of the training outcome dimensions of Level 1 (reactions) and Level 2 (learning and attitudes) is shown in Table 4.

Affect Before and After the Humor Intervention

Positive affect [$M_{t(i0)} = 3.49$, $SD_{t(i0)} = 0.588$; $M_{t(i1)} = 3.91$, $SD_{t(i1)} = 0.746$] was significantly increased after the humor intervention [$t_{(66)} = 5.81$, $p \leq 0.001$, $d_z = 0.71$], while negative affect was significantly decreased [$M_{t(i0)} = 1.49$, $SD_{t(i0)} = 0.608$; $M_{t(i1)} = 1.23$, $SD_{t(i1)} = 0.374$] after humor intervention [$t_{(66)} = -4.28$, $p \leq 0.001$, $d_z = -0.52$]. The humor intervention resulted in an increase in positive affect and a decrease in negative affect (see Figure 2). The intercorrelations of acute changes in positive affect and negative affect due the humor intervention with sense of humor and its subscales, as well as perceived stress, work enjoyment, frequency of flow experience, and perceived meaningfulness of work as measured at t_1 , are depicted in Table 5.

Testing the Effectiveness of the Humor Intervention

First of all, there are significant effects of time in the overall group, showing that the sense of humor decreases from t_0 to t_1 : Those significant main effects of time were found for *sense of humor* [$F_{(1,73)} = 8.51$, $p = 0.005$, $\eta^2 = 0.104$], as well as for the subscales *finding humor in everyday life* [$F_{(1,73)} = 7.69$, $p = 0.007$, $\eta^2 = 0.095$], *laughter* [$F_{(1,73)} = 8.39$, $p = 0.005$, $\eta^2 = 0.103$], and *enjoyment of humor* [$F_{(1,73)} = 8.22$, $p = 0.005$, $\eta^2 = 0.101$]. There are no significant main effects over time for *humor under stress* [$F_{(1,73)} = 1.29$, $p = 0.260$, $\eta^2 = 0.017$], *verbal humor* [$F_{(1,73)} = 2.28$, $p = 0.135$, $\eta^2 = 0.030$], and *laughing at yourself* [$F_{(1,73)} = 3.46$, $p = 0.067$, $\eta^2 = 0.045$]. The group had no significant main effects.

Testing Hypothesis 1: The humor intervention has a positive effect on the nurses’ sense of humor and the six sense of humor habits.

To test hypothesis 1, we looked at the interaction effects of time*group on the sense of humor variables from t_0 to t_1 . Significant interaction effects were found on *sense of humor* [$F_{(1,73)} = 6.26$, $p = 0.015$, $\eta^2 = 0.079$; see Figure 3], as well as on the subscales *finding humor in everyday life* [$F_{(1,73)} = 5.29$, $p = 0.024$, $\eta^2 = 0.068$] and *verbal humor* [$F_{(1,73)} = 10.94$, $p = 0.001$, $\eta^2 = 0.130$]. On these (sub)scales it was shown that sense of humor decreased from t_0 to t_1 in the control group, while it remained stable over time in the intervention group.

For *humor under stress* [$F_{(1,73)} = 2.20$, $p = 0.142$, $\eta^2 = 0.029$], *laughing at yourself* [$F_{(1,73)} = 2.34$, $p = 0.130$, $\eta^2 = 0.031$], *laughter* [$F_{(1,73)} = 0.04$, $p = 0.842$, $\eta^2 = 0.001$], and *enjoyment*

TABLE 2 | Shows means, standard deviations of all study variables.

Variable	<i>M</i> (<i>N</i>)	<i>SD</i>	<i>M</i> _{CG} (<i>N</i> _{CG})	<i>SD</i> _{CG}	<i>M</i> _{IG} (<i>N</i> _{IG})	<i>SD</i> _{IG}
1 Sense of humor (t ₀)	4.91 (104)	0.782	4.88 (33)	0.536	4.92 (71)	0.876
2 Sense of humor (t ₁)	4.73 (94)	0.789	4.50 (31)	0.635	4.84 (63)	0.837
3 Enjoyment of humor (t ₀)	4.39 (104)	0.972	4.44 (33)	0.879	4.37 (71)	1.018
4 Enjoyment of humor (t ₁)	4.18 (94)	0.900	4.02 (31)	0.853	4.26 (63)	0.915
5 Finding humor in everyday life (t ₀)	5.19 (104)	0.963	5.11 (33)	0.645	5.22 (71)	1.082
6 Finding humor in everyday life (t ₁)	4.97 (94)	0.938	4.70 (31)	0.737	5.10 (63)	1.002
7 Laughing at yourself (t ₀)	5.41 (104)	0.992	5.28 (33)	0.806	5.47 (71)	1.068
8 Laughing at yourself (t ₁)	5.18 (94)	0.985	4.82 (31)	0.933	5.35 (63)	0.970
9 Laughter (t ₀)	5.25 (104)	0.934	5.17 (33)	0.792	5.29 (71)	0.996
10 Laughter (t ₁)	4.93 (94)	0.977	4.85 (31)	0.941	4.98 (63)	0.999
11 Verbal humor (t ₀)	4.42 (104)	1.215	4.59 (33)	0.875	4.37 (71)	1.342
12 Verbal humor (t ₁)	4.41 (94)	1.107	4.25 (31)	0.731	4.49 (63)	1.250
13 Humor under stress (t ₀)	4.78 (104)	1.122	4.68 (33)	0.956	4.83 (71)	1.195
14 Humor under stress (t ₁)	4.68 (94)	1.074	4.35 (31)	0.880	4.84 (63)	1.127
15 Perceived stress (t ₁)	2.27 (94)	0.410	2.30 (31)	0.358	2.26 (63)	0.436
16 Work enjoyment during practical training (t ₁)	2.63 (94)	0.534	2.49 (31)	0.412	2.70 (63)	0.576
17 Flow frequency (t ₁)	3.95 (93)	0.705	3.83 (30)	0.673	4.01 (63)	0.717
18 Perceived meaningfulness of work (t ₁)	4.82 (94)	0.829	4.68 (31)	0.812	4.88 (63)	0.835

Scale-Range (1–7) = Sense of humor, Enjoyment of humor, Finding humor in everyday life, Laughing at yourself, Laughter, Verbal humor, Humor under stress; (1–4) = Perceived Stress, Work enjoyment during practical; (1–6) = Flow frequency, Perceived Meaningfulness of work; CG, control group; IG, intervention group; Measuring points: t₀ = Baseline; t₁ = 6 months after the humor intervention.

TABLE 3 | Intercorrelation of all study variables.

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	
1 Sense of humor (t ₀)	1																		
2 Sense of humor (t ₁)	0.74 **	1																	
3 Enjoyment of humor (t ₀)	0.47 **	0.30 **	1																
4 Enjoyment of humor (t ₁)	0.42 **	0.54 **	0.66 **	1															
5 Laughter (t ₀)	0.74 **	0.61 **	0.33 **	0.39 **	1														
6 Laughter (t ₁)	0.57 **	0.82 **	0.19 *	0.43 **	0.77 **	1													
7 Verbal humor (t ₀)	0.83 **	0.64 **	0.25 *	0.23 *	0.51 **	0.41 **	1												
8 Verbal humor (t ₁)	0.64 **	0.84 **	0.20 *	0.32 **	0.46 **	0.63 **	0.72 **	1											
9 Finding humor in everyday life (t ₀)	0.90 **	0.65 **	0.19 *	0.22	0.57 **	0.45 **	0.80 **	0.57 **	1										
10 Finding humor in everyday life (t ₁)	0.72 **	0.89 **	0.16 *	0.30 **	0.57 **	0.66 **	0.67 **	0.74 **	0.74 **	1									
11 Laughing at yourself (t ₀)	0.79 **	0.65 **	0.11	0.24 *	0.55 **	0.51 **	0.63 **	0.54 **	0.77 **	0.65 **	1								
12 Laughing at yourself (t ₁)	0.58 **	0.82 **	0.10	0.29 **	0.35 **	0.60 **	0.53 **	0.62 **	0.57 **	0.76 **	0.72 **	1							
13 Humor under stress (t ₀)	0.80 **	0.51 **	0.28 **	0.23 *	0.44 **	0.32 **	0.57 **	0.41 **	0.76 **	0.50 **	0.54 **	0.33 **	1						
14 Humor under stress (t ₁)	0.56 **	0.81 **	0.16 *	0.28 **	0.37 **	0.55 **	0.43 **	0.62 **	0.54 **	0.75 **	0.43 **	0.61 **	0.60 **	1					
15 Perceived stress (t ₁)	-0.12	-0.22 *	0.02	-0.02	-0.12	-0.23 *	-0.07	-0.09	-0.13	-0.18	-0.19	-0.33 **	-0.08	-0.21 *	1				
16 Work enjoyment during practical training (t ₁)	0.21	0.38 **	0.13	0.19	0.28 *	0.36 **	0.05	0.26 *	0.16	0.33 **	0.10	0.31 **	0.24 *	0.37 **	-0.56**	1			
17 Flow frequency (t ₁)	0.18	0.42 **	-0.01	0.08	0.22	0.35 **	0.11	0.27 **	0.19	0.39 **	0.08	0.37 **	0.23	0.50 **	-0.26*	0.54**	1		
18 Perceived meaningfulness of work (t ₁)	0.36 *	0.41 **	0.08	0.03	0.27 *	0.28 **	0.27 *	0.31 **	0.35 **	0.46 **	0.36 **	0.40 **	0.30 **	0.45 **	-0.37**	0.58**	0.48**	1	

***p* < 0.001; **p* < 0.050; Measuring points: t₀ = Baseline; t₁ = 6 months after the humor intervention.

of humor [$F_{(1,73)} = 2.80, p = 0.099, \eta^2 = 0.037$] no interaction effects with group and time could be found.

Testing Hypothesis 2: Sense of humor mediates the effect of the humor intervention on perceived stress.

In the mediation model of hypothesis 2, the humor intervention (t_0) is the independent variable, sense of humor (t_1) is the mediator and perceived stress (t_1) the dependent variable.

TABLE 4 | Shows means and standard deviations of the training outcome dimensions.

Variable	M	SD
Training outcome dimensions		
Level 1 (reactions)		
1 Subjective enjoyment	4.25	0.671
2 Perceived usefulness	4.27	0.675
3 Perceived difficulty	4.63	0.467
Level 2 (learning and attitude)		
4 Subjective knowledge gain	4.00	0.758
5 Attitude toward training	4.26	0.642

Measured with the TEI (103) on a 5-point Likert scale directly after the humor intervention [$t_{(i1)}$].

The *a*-path ($\beta = 0.20, SE = 0.10, t = 2.00, p = 0.049$) and *b*-path ($\beta = -0.22, SE = 0.10, t = -2.10, p = 0.039$) were both significant. However, neither the total effect ($\beta = -0.04, SE = 0.10, t = -0.42, p = 0.673$), nor the direct effect ($\beta = 0.00, SE = 0.10, t = 0.01, p = 0.996$) or the indirect effect ($\beta = -0.04, SE = 0.03, -0.11 < CI < 0.00$) were significant. Accordingly, hypothesis 2 could not be confirmed (see **Figure 4**).

Testing Hypothesis 3: Sense of humor mediates the effect of the humor intervention on work enjoyment during practical training.

To test hypothesis 3, the mediation model includes the humor intervention (t_0) as independent variable, the sense of humor (t_1) as mediator, and work enjoyment (t_1) as dependent variable. We could show significant results for the *a*-path ($\beta = 0.20, SE = 0.10, t = 2.00, p = 0.049$) and *b*-path ($\beta = 0.36, SE = 0.10, t = 3.68, p \leq 0.001$). The total effect ($\beta = 0.18, SE = 0.10, t = 1.76, p = 0.082$) and direct effect ($\beta = 0.11, SE = 0.10, t = 1.09, p = 0.280$) were not significant. However, we could show a significant indirect effect ($\beta = 0.07, SE = 0.04, 0.01 < CI < 0.15$). Sense of humor thus mediates a positive effect of the humor intervention on work enjoyment (see **Figure 5**).

Testing Hypothesis 4: Sense of humor mediates the effect of the humor intervention on the frequency of flow experience.

In the mediation model the humor intervention (t_0) is the independent variable, sense of humor (t_1) is the mediator and the frequency of flow (t_1) is the dependent variable. While the

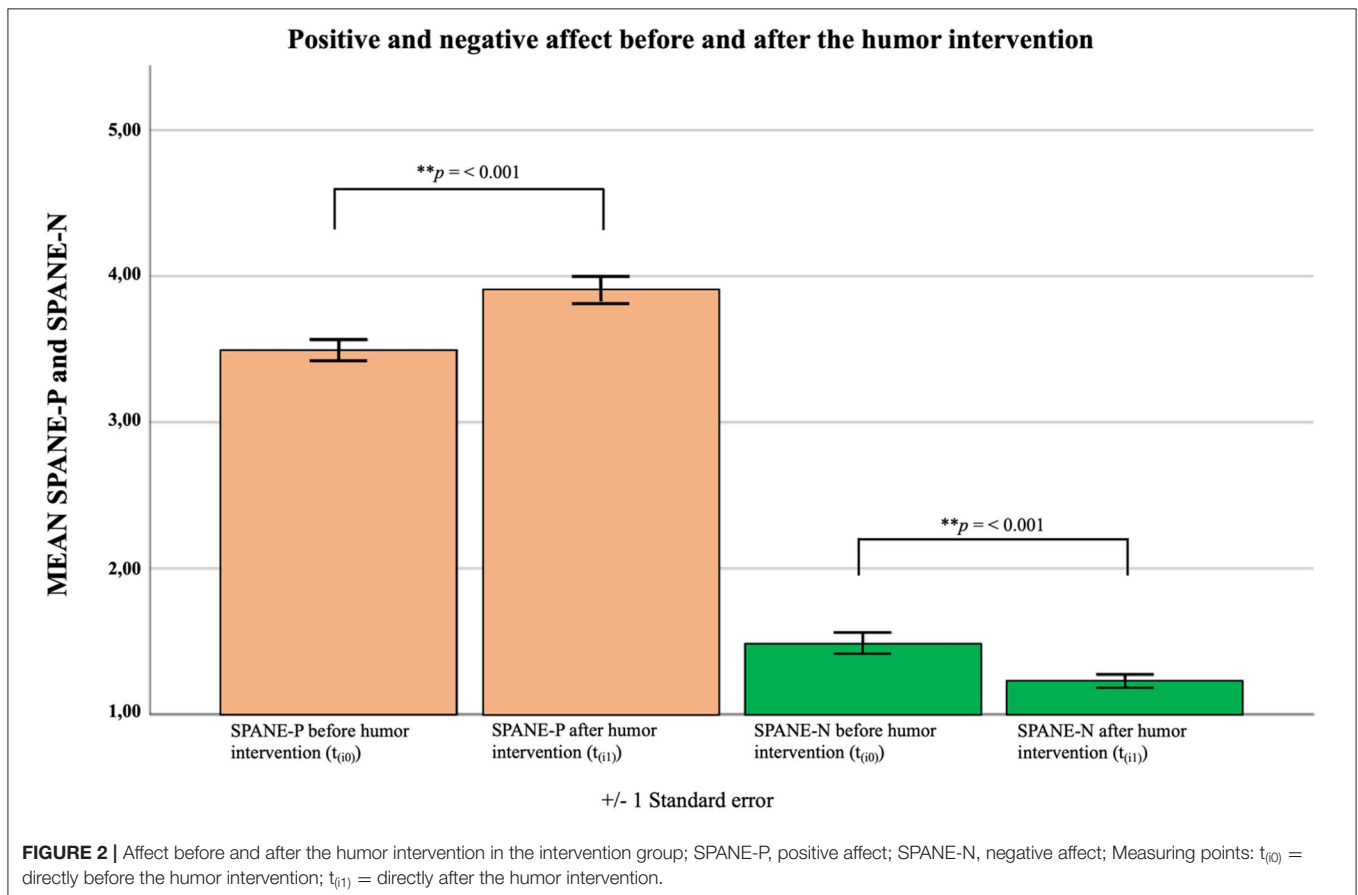
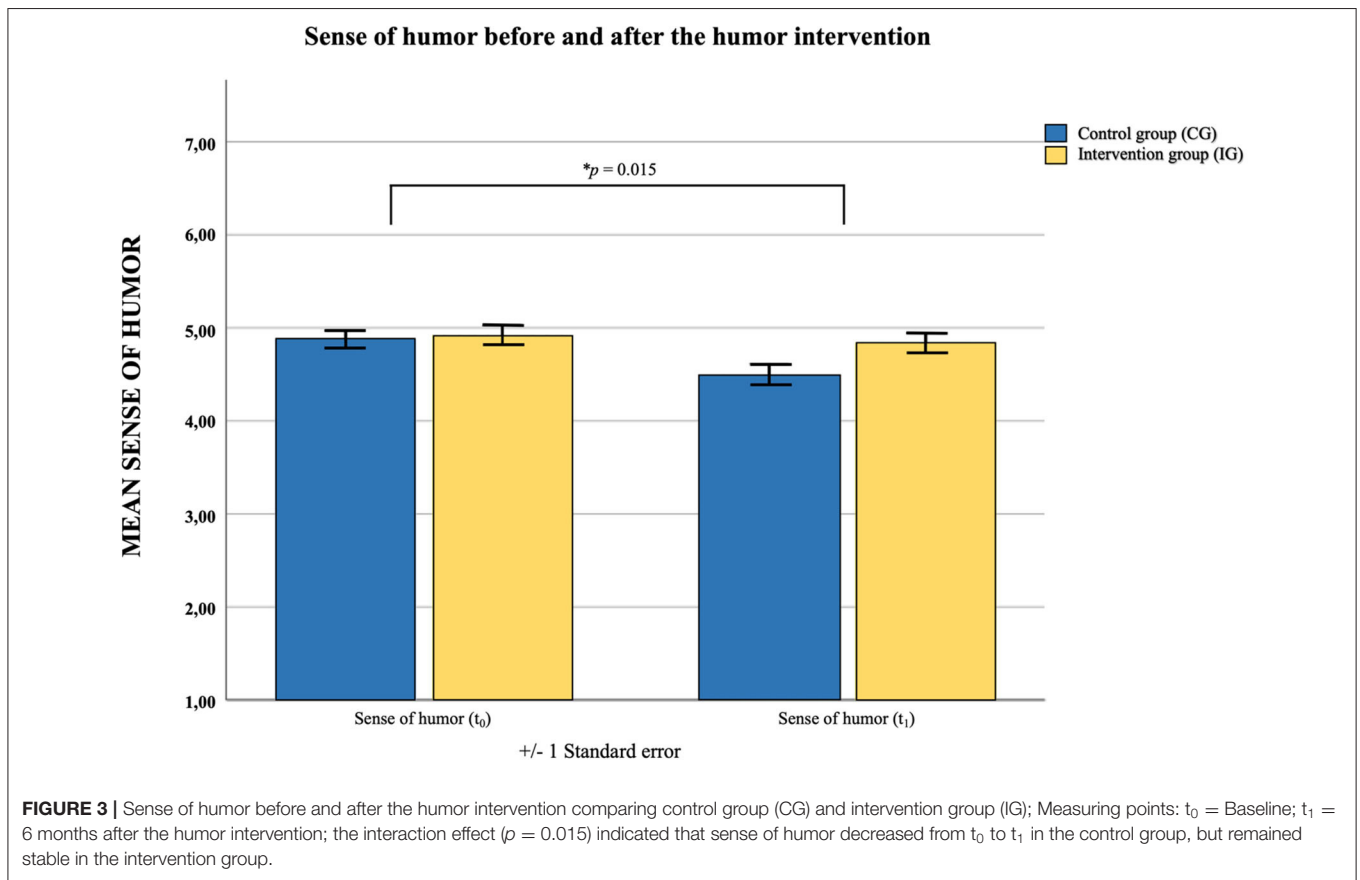


TABLE 5 | Intercorrelation of difference scores of affect at t_1 with work experience 6 months after the humor intervention.

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13
1 Difference score of positive affect (t_1-t_0)	1												
2 Difference score of negative affect (t_1-t_0)	-0.36 **	1											
3 Sense of humor (t_1)	0.11	-0.03	1										
4 Enjoyment of humor (t_1)	0.29 *	-0.04	0.52 **	1									
5 Laughter (t_1)	0.10	-0.05	0.84 **	0.41 **	1								
6 Verbal humor (t_1)	-0.00	-0.09	0.86 **	0.32 *	0.63 **	1							
7 Finding humor in everyday life (t_1)	0.05	-0.05	0.92 **	0.31 *	0.73 **	0.80 **	1						
8 Laughing at yourself (t_1)	0.00	-0.00	0.81 **	0.33 **	0.62 **	0.64 **	0.75 **	1					
9 Humor under stress (t_1)	0.12	0.08	0.82 **	0.23	0.62 **	0.66 **	0.76 **	0.56 **	1				
10 Perceived stress (t_1)	-0.05	0.04	-0.21	-0.12	-0.25	-0.07	-0.11	0.33 **	-0.18	1			
11 Work enjoyment during practical training (t_1)	0.36 *	0.07	0.35 **	0.24	0.32 **	0.22	0.28 *	0.26 *	0.36 **	-0.53 **	1		
12 Flow frequency (t_1)	0.23	-0.06	0.35 **	-0.02	0.27 *	0.26 *	0.33 **	0.27 *	0.51 **	-0.27 *	0.56 **	1	
13 Perceived meaningfulness of work (t_1)	0.22	-0.02	0.41 **	0.06	0.27 *	0.37 **	0.43 **	0.36 **	0.45 **	-0.33 **	0.58 **	0.43 **	1

** $p < 0.001$; * $p < 0.050$; Measuring points: t_1-t_0 = Difference scores: measures are taken immediately before and immediately after the humor intervention; t_1 = 6 months after the humor intervention.

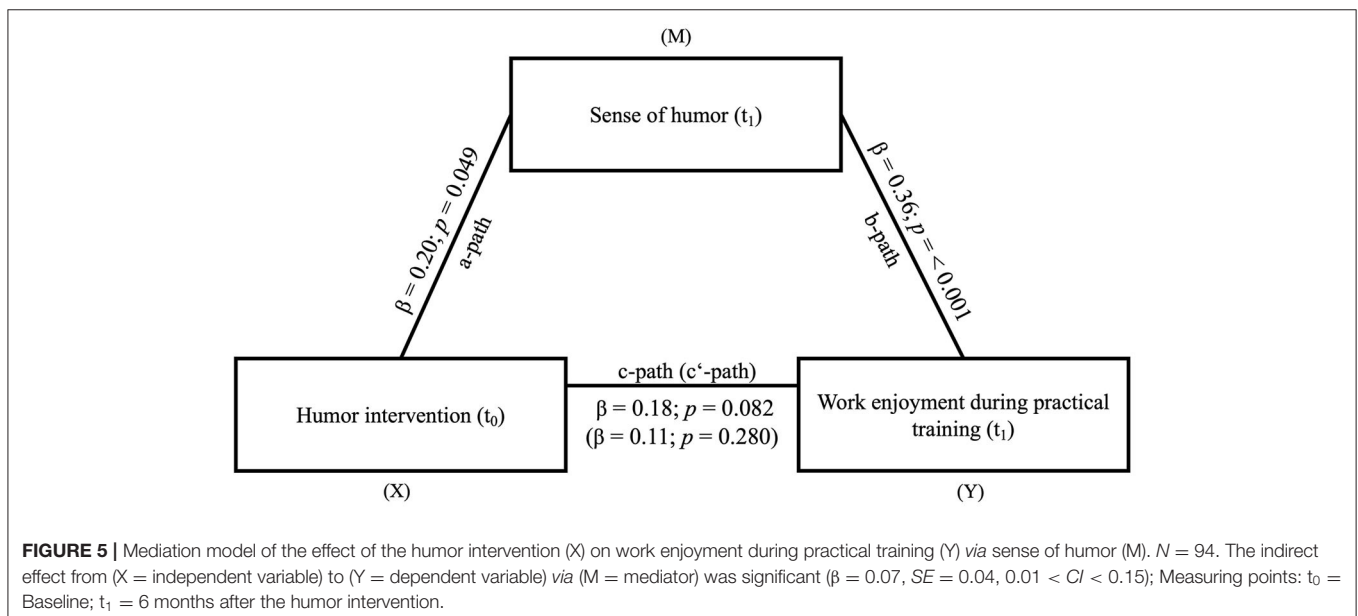
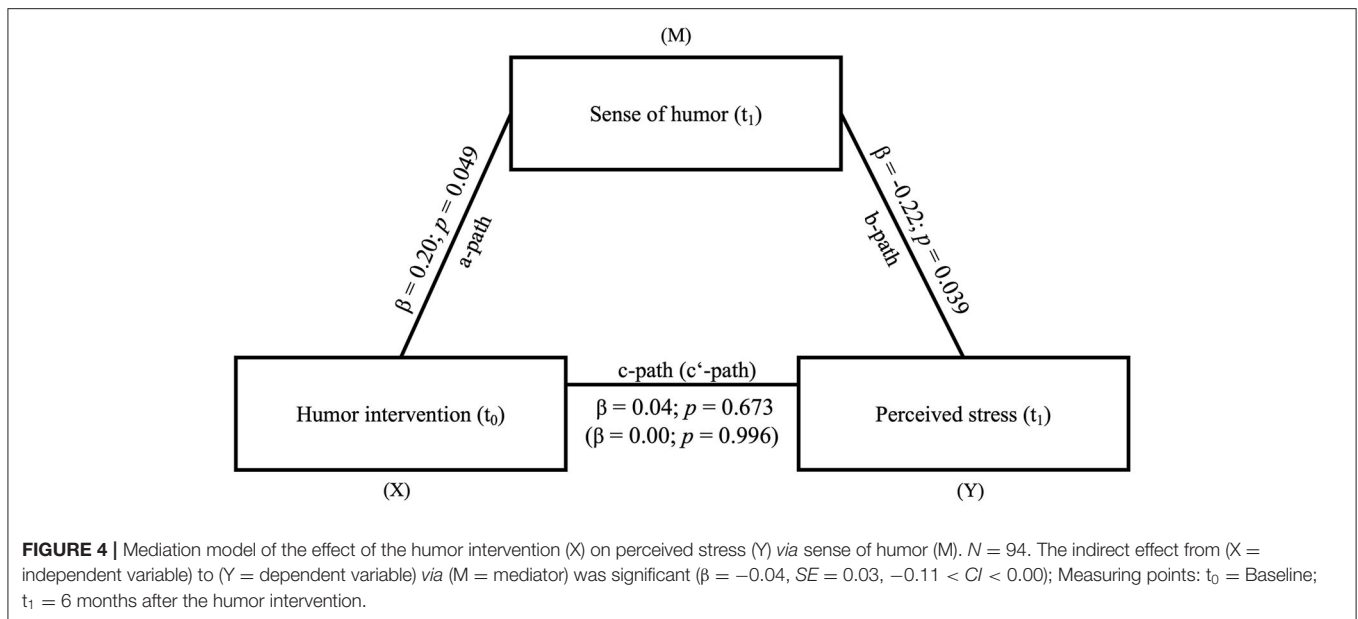


a -path ($\beta = 0.20$, $SE = 0.10$, $t = 1.94$, $p = 0.055$) was just barely not significant, the b -path ($\beta = 0.41$, $SE = 0.09$, $t = 4.18$, $p \leq 0.001$) was significant. The total effect ($\beta = 0.12$, $SE = 0.10$, $t = 1.20$, $p = 0.235$) and the direct effect ($\beta = 0.04$, $SE = 0.10$, $t = 0.44$, $p = 0.662$) were not significant. However, we found a significant indirect effect ($\beta = 0.08$, $SE = 0.04$, $0.01 < CI < 0.17$) in the mediation model.

The sense of humor thus transmits a positive effect of the humor intervention on flow frequency. For an overview, see **Figure 6**.

Testing Hypothesis 5: Sense of humor mediates the effect of the humor intervention on the perceived meaningfulness of work.

The mediation model involved sense of humor (t_1) as mediator and the perceived meaningfulness of work (t_1) as

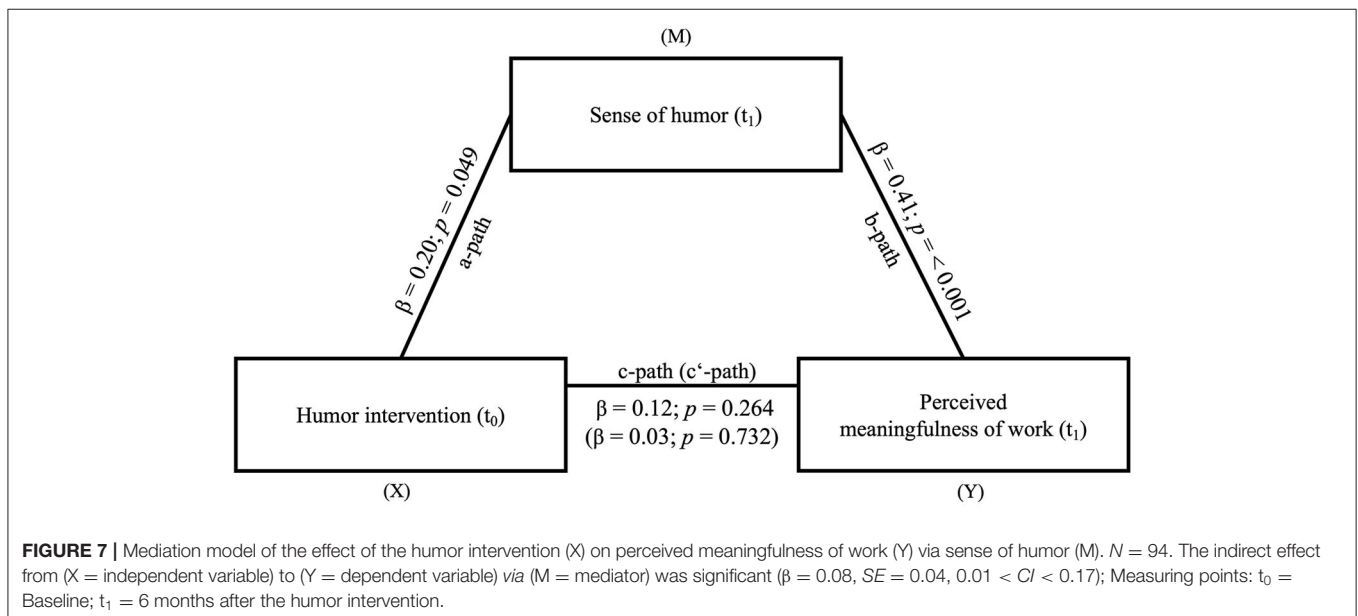
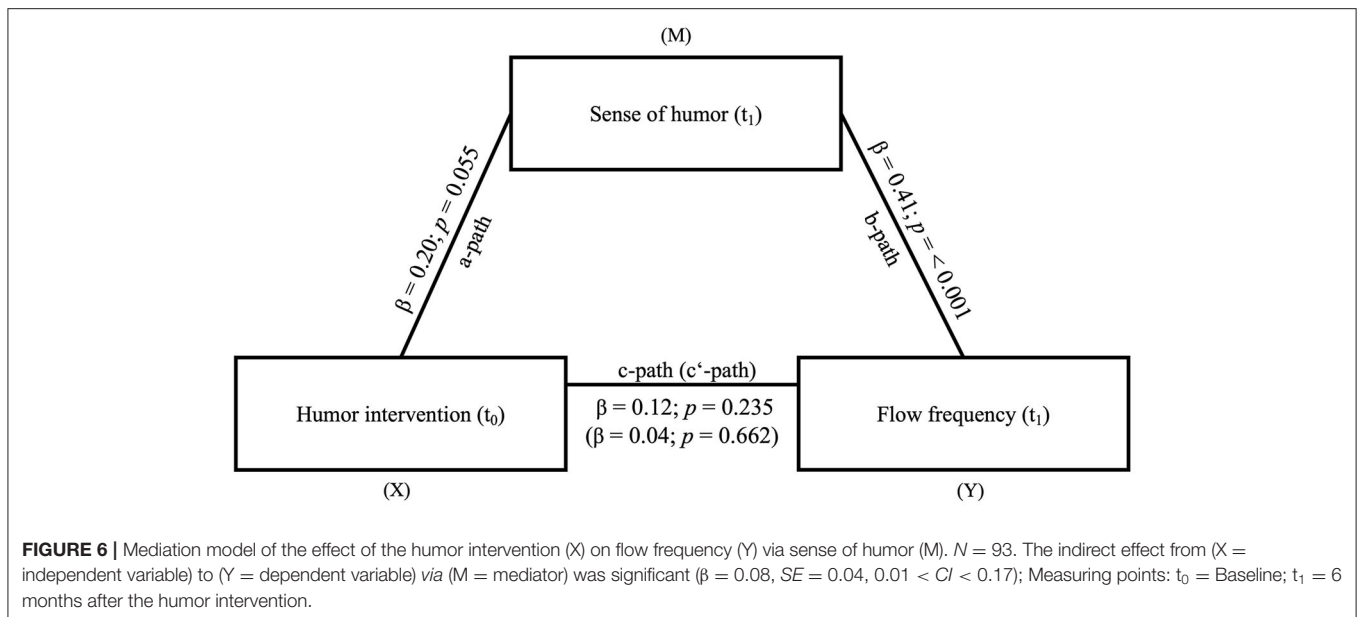


dependent variable. The independent variable in the mediation model is the humor intervention (t_1). We could find significant results for the *a*-path ($\beta = 0.20$, $SE = 0.10$, $t = 2.00$, $p = 0.049$) and *b*-path ($\beta = 0.41$, $SE = 0.10$, $t = 4.17$, $p \leq 0.001$). The total effect ($\beta = 0.12$, $SE = 0.10$, $t = 1.12$, $p = 0.264$) and the direct effect ($\beta = 0.03$, $SE = 0.10$, $t = 0.34$, $p = 0.732$) were not significant. However, we could show a significant indirect effect ($\beta = 0.08$, $SE = 0.04$, $0.01 < CI < 0.17$). It can be concluded that sense of humor mediates a positive effect of the humor intervention on the perceived meaningfulness of work (see **Figure 7**). For an overview of the results of hypotheses 2–5, see **Table 6**.

DISCUSSION

Summary of Results

In this study, we examined the effect of a humor intervention on the sense of humor in an intervention group with nurses in training, while a control group received no intervention. We were able to show in the results that the humor intervention had a protective effect on sense of humor in the intervention group, while the sense of humor in the control group decreased over a 6-month period. In addition, we found that the sense of humor mediated the effects of the humor intervention on work enjoyment, frequency of flow experience, and perceived meaningfulness of work. The sense of humor did not mediate



the effect of the humor intervention on perceived stress. However, a direct negative effect of sense of humor on perceived stress was shown in the mediation model. Furthermore, we found that the humor intervention acutely increased positive affect and decreased negative affect. On a descriptive level of analysis, the nurses in training in the intervention group reported that they enjoyed the humor intervention, and the content of the humor intervention was also evaluated as useful for the nursing profession. Additionally, they rated the content of the humor intervention as easy to understand. The attitude toward the humor intervention was very positive and the humor intervention led to a subjective knowledge gain regarding its content. The nurses in training reported that their knowledge has expanded in the long term as a

result of the humor intervention and that they are able to remember the content of the humor intervention well. It can be concluded that the implementation of the humor intervention in the context of nursing work was rated as very positive overall. Furthermore, we found positive correlations between the acute change in positive affect due to the intervention with enjoyment of humor and work enjoyment 6 months later.

Discussion of the Hypotheses

In Hypothesis 1 we had postulated that the humor intervention would have a positive effect on the nurses' sense of humor and the six sense of humor habits. However, this was not exactly what we found: Instead of finding an increase of the sense of

TABLE 6 | Mediation models of the effect of the humor intervention (X) via sense of humor (M) on the dependent variable (Y).

Variable (Y)	a-path				b-path			c-path			c'-path			Indirect effect β; CI			
	β	SE	t	*	β	SE	t	*	β	SE	t	n.s.	β		SE	t	n.s.
Perceived stress (H2)	0.20	0.10	2.00	*	-0.22	0.10	-2.10	*	0.04	0.10	-0.42	n.s.	0.00	0.10	0.01	n.s.	β = -0.04; -0.11 < CI < 0.00
Work enjoyment during practical training (H3)	0.20	0.10	2.00	*	0.36	0.10	1.76	**	0.18	0.10	1.76	n.s.	0.11	0.10	1.09	n.s.	β = 0.07; 0.07 < CI < 0.15
Flow frequency (H4)	0.20	0.10	1.94	n.s.	0.41	0.09	4.18	**	0.12	0.10	1.20	n.s.	0.04	0.10	0.44	n.s.	β = 0.08; 0.01 < CI < 0.17
Perceived meaningfulness of work (H5)	0.20	0.10	2.00	*	0.41	0.10	4.17	**	0.12	0.10	1.12	n.s.	0.03	0.10	0.34	n.s.	β = 0.08; 0.01 < CI < 0.17

(H), Hypothesis; n.s., not significant; ** $p < 0.001$; * $p < 0.050$; X = independent variable (IG vs. CG); M = mediator (sense of humor); Y = dependent variable.

humor in the intervention group, we found it to be stable while it decreased in the control group. The finding of a decreased sense of humor in the group without intervention is, however, in line with other findings that, over the time of professional training, nurses show a decreased work satisfaction (106) and even the tendency to quit work (107), so such kinds of decreases are a typical although alarming phenomenon of the profession. Thus, we consider our finding that the humor intervention keeps the sense of humor stable during a 6-month post-measurement compared to a control group as a positive result that confirms Hypothesis 1. The finding is that sense of humor can be positively affected through training and is consistent with results from other studies (33, 54). We found the same result for some subscales of the sense of humor: “finding humor in everyday life” and “verbal humor.” This finding is highly plausible as the evaluated first module of our humor intervention addressed particularly positive communication in the nursing profession. The positive effect on the sense of humor habit “verbal humor” is promising here, as it improves people’s communication skills and thus their ability to deal with conflicts (17). Its use will probably make it easier for nurses in training to establish contact with patients in the future. The sense of humor habit *finding humor in everyday life* can also help nurses in training to further develop the sense of humor in the future (17). For the subscale’s *enjoyment of humor, laughing at yourself, laughter, and humor under stress*, we could not report any change due to our humor intervention. Later modules of the intervention will focus on other aspects of the sense of humor; at present, their effects on the outcome variables remain to be tested.

Our results of hypothesis 2—that sense of humor mediates the effect of the humor intervention on perceived stress—was not confirmed, as the indirect effect was not significant. However, both the a-path and b-path of the mediation model were significant in the predicted direction, i.e., the humor intervention had a positive effect on the sense of humor at t_1 (a-path) and the sense of humor had a negative effect on perceived stress (b-path). Possibly, the sample size and, thus, the power of our study were not large enough to detect an existing effect. Furthermore, the focus of the intervention was on positive communication and contact with the patient. One study shows that direct contact with patients can be a stressor for nurses, but other stress factors can also be identified in the nursing profession, such as emotional demands from

patients, uncomfortable work environments, time pressure, or administrative responsibilities (108). Accordingly, a multitude of stressors might have influenced the perception of stress, and future interventions should also address other potential stressors. We must also point out that stress management will be dealt with at a later stage in our training series “Care for joy,” and we might be able to confirm hypothesis 3 at a later point in time. Still, the finding that sense of humor was negatively associated with perceived stress (b-path) is nevertheless consistent with previous studies on humor and stress [see e.g., (14–18)] and underlines the potential of sense of humor as a coping strategy.

The results in this study confirm Hypothesis 3, i.e., that our humor intervention has an indirect effect on work enjoyment *via* sense of humor. This result is consistent with the results that the use of humor in the workplace can lead to greater work enjoyment (74). Such an increase in work enjoyment is associated with positive consequences such as increased performance and reduced psychological stress (65).

Furthermore, our study provides additional results on the as-yet scarce research on the relationship between humor and flow experience. The postulated indirect effect of the humor intervention *via* sense of humor on the frequency of flow (Hypothesis 4) could be confirmed. The effect of sense of humor on the frequency of flow experience is consistent with the results of the studies by Plester and Hutchison (87) and Bakker and van Woerkom (92), which described fun as a predictor for achieving flow experience. In the study by van Oortmerssen et al. (88) a small correlation between flow and humor was found, but no further effects of humor and flow could be reported. Our results are particularly relevant for the work context, because well-being (77–81) and job satisfaction (109) are positively influenced by flow experience.

Hypothesis 5, which postulated that the sense of humor mediates the effect of the humor intervention on the perceived meaningfulness of work, was also confirmed. To our knowledge, there are no studies so far that have investigated the relationship between perceived meaningfulness of work and humor. This study thus gives a first empirical support of this association. This association is in line with humor as a character strength belonging to the category of transcendence strengths (26). Transcendence strengths in the character strength model are defined as strengths that create meaning. Humor may help to

look at the positive sides of life, and humor may similarly help people to perceive the good sides of their own profession.

In sum, hypotheses 2–5 provided evidence that sense of humor positively affects workplace experience. As outlined in the introduction, humor is related to positive emotions, which act as a buffer toward stress (40). The association of humor with positive emotions is also reflected in the brain: for example an MRI study reported that humor causes activation in the mesolimbic dopaminergic reward system (110) and rewards can lead to positive experiences such as positive emotions and joy (111). Furthermore, humor was found to reduce the stress hormone cortisol (112). In line with this, individuals who use humor as a stress coping method are more likely to see stressful situations as a challenge rather than a threat (113). Through such a stress-buffering effect, which is even visible physiologically, humor can contribute to positive work experiences and to an increase in job satisfaction (114).

Implications for Nursing

Our results provide first, but promising evidence that humor interventions can have a positive impact when included in the training curriculum for prospective nurses. Sense of humor in the nursing context has many positive effects, such as reduced stress, increased work enjoyment, frequency of flow, and perceived meaningfulness of work. Therefore, one could also expect positive effects of humor interventions, not only for nurses in training, but also for trained nurses and other health care professionals like physicians and therapists.

In future implementations of the humor interventions, a booster/refresher session after the humor intervention could be helpful to consolidate learnings for more pronounced results. Refreshers have been shown to significantly increase training effectiveness (115). A potential refreshing intervention could be implemented using an accompanying mobile app. Such a mobile app could be used to send brief exercises to the participants which could help to ensure transfer into practice. Also, this app could contain summaries from the humor intervention and a forum in which users can share and discuss their experiences.

In general, literature shows that humor leads to an increase in well-being (32–35), which, however, depends on different humor styles: for example aggressive humor and self-defeating humor can even lead to a decrease in well-being (34). Accordingly, it is even more important that nurses are trained on the topic of humor, so that the humor styles hindering for well-being in the work context can be consciously avoided. Misapplied humor, also called “the dark side of humor,” can also have a negative impact on relationships between colleagues at work (116). On the other hand, good forms of humor can contribute to positive relationship building among colleagues (49). Positive relationships at work are important resources, and it has been shown that colleague support can contribute to staying in a job rather than quitting (117).

It can be concluded that humor is a promising intervention in the context of health care.

Limitations and Future Research

There are some limitations in this study that we would like to discuss. First of all, our study included one cohort of nurses

in training from two nursing schools. While all nurses of the cohort were included in the study, our sample was still relatively small, which has implications for the power of statistical analyses and the probability of finding significant effects (118, 119). In order to detect relationships and differences of a still reasonable effect size (i.e., to reduce the probability of the type II error), we decided to not apply Bonferroni correction. This implies a higher risk that the null hypothesis is rejected although it is true. At the same time, findings regarding positive effects on work experience were very consistent for the different constructs, so we are optimistic that our findings will be replicable in larger samples. Furthermore, when comparing the intervention group and the control group, it is noticeable that the control group was smaller than the intervention group. Of course, equal sample sizes would have been desirable. Unfortunately, the cohort in the nursing school, which served as control condition, was smaller than the intervention cohort. Still, we consider the findings as first evidence for the effectiveness of a humor intervention for nurses in training. Future studies should add upon our initial results and aim at a larger sample size at best in a multicentric study to validate and generalize findings.

Another potential limitation of our study is that the possibility of randomization was limited. Students of one school were automatically assigned to the intervention group, students from the other school to the control group. This was necessary for several reasons: first, students are based in fixed classes, doing their training together. This means that from an organizational viewpoint, it would have been difficult to separate classmates. Second, even if classmates would have been separated, it is likely that students would have discussed their learnings with their classmates, which could have affected the results (crossover-effects). Therefore, we decided to separate students by school. Having baseline measures of both schools, we consider this a minor problem. Still, future investigations that apply a multicentric approach will be able to overcome this potential limitation.

Furthermore, we see potential for the improvement of our intervention: while the intervention group was given a “homework” exercise for the practice phase, we believe that a refresher session within the 6 months between the first and second measurement would increase the effects. This could also be done with a mobile app, reminding the participants of the contents of the intervention and providing small refresher tasks.

Finally, we want to address the statistical analyses conducted in this study: We have reported separate mediation models instead of one holistic model. This could be done using structural equation modeling. Again, a larger sample size would be necessary for such an endeavor.

Another potential future line of research is the link between humor and stress. There is as yet very little research in this area and the mechanisms of how humor reduces stress are not yet well-understood. One potential mechanism could be the concept of flow Bartzik and Peifer². Flow was found to

²Bartzik M, Peifer C. On the relationships between humour, stress and flow experience – Introducing the Humour-Flow Model (in revision).

occur when a stress-relevant situation is re-interpreted as a pleasant challenge (120). Humor could act as a resource that helps to re-interpret an undesirable situation into a more favorable one, i.e., it could help reaching flow in stress-relevant situations (121)¹. Future research should further explore this and other potential mechanisms explaining the link between humor and stress.

DATA AVAILABILITY STATEMENT

The raw anonymized data supporting the conclusions of this article will be made available by the authors upon request and in accordance with the ethical consent provided by participants.

ETHICS STATEMENT

This study involved human participants and was reviewed and approved by the local ethics committee at the Faculty of Psychology, Ruhr University Bochum, Germany. Written informed consent to participate in this study was provided by the participants.

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AUTHOR CONTRIBUTIONS

MBa, CP, AB, SH, AD-D, and PA carried out the study. MBa and CP developed the theory, wrote the methods and discussion. MBa performed the computations and wrote the results. CP supervised the concept and findings of this work. All authors conceived of the presented idea, discussed the results, and contributed to the final manuscript.

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SUPPLEMENTARY MATERIAL

The Supplementary Material for this article can be found online at: <https://www.frontiersin.org/articles/10.3389/fpubh.2021.667821/full#supplementary-material>

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