The role of participants' adoption of intervention components in intervention effectiveness; A quantitative study of a multi-component intervention

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Abstract

This study examines whether the extent to which participants adopt the components of a multi-component health intervention influences its effectiveness. Although interventions are often evaluated based on overall outcomes, less attention is given to differences in how participants actually apply intervention components in daily life. This study therefore positions adoption as a central explanatory construct and examines coping capacity as a moderator in this relationship. Using a longitudinal, non-experimental design, secondary survey data were collected at baseline and follow-up among 85 participants of Company X's intervention. Analyses were conducted to examine the relationship between adoption of seven intervention components and stress level, physical and mental complaints, and well-being, while controlling for demographic variables. The results show that stronger adoption of the AC-process and AT components is associated with greater reductions in physical and mental complaints. However, adoption did not significantly predict stress level or well-being. Coping capacity did not moderate the relationship between adoption and the outcome variables. These findings suggest that adoption plays a selective and component-specific role in intervention effectiveness.

Key words: Intervention adoption, multi-component intervention, intervention effectiveness, coping capacity, stress level, physical and mental complaints, well-being

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List of abbreviations

Abbreviation	Meaning
AC-process	'Alexander Concept' process
AT	'Actieve Taal'
DV	Dependent Variable
H1, H2, H3, H4	Hypotheses 1, 2, 3 and 4
IBM SPSS	International Business Machines Statistical Package for the Social Sciences
IV	Independent Variable
JS	'Juiste Staat'
KMO	Kaiser-Meyer-Olkin measure of sampling adequacy
KR	'Korte Route'
M	Mean
N	Sample size
OO	'Overtuigingen Omzetten'
p	Probability value (significance level)
PCA	Principal Component Analysis
PS	'Positief Selecteren'
RQ	Research Question
SD	Standard Deviation
SE	Standard Error
T0	Baseline measurement
T1	Follow-up measurement
VBH	'Verbonden Brein-Houding'
VIF	Variance Inflation Factor
WHO	World Health Organisation
QCA	Qualitative Comparative Analyses
α	Cronbach's alpha
ΔR^2	Change in explained variance

Chapter 1: Introduction

In recent years, interventions aimed at improving health and well-being have received increasing attention from both researchers and practitioners (Craig et al., 2008; Skivington et al., 2021; World Health Organization, 2022). These interventions are typically designed to help individuals cope with stress, enhance mental health and improve overall quality of life (Bonde et al., 2018). Work related stress and health complaints have become pressing issues in modern organisations. Rising demands, rapid technological change and increasing work pressures place significant strain on employees' mental and physical health (Bakker et al., 2007). High stress levels and persistent health complaints affect individual well-being and also generate substantial costs for organizations in terms of absenteeism and reduced productivity (Cooper & Dewe, 2008). In response, organisations have increasingly invested in health promotion and well-being interventions designed to reduce stress, lower physical and mental complaints and enhance individual well-being (Lamontagne et al., 2007).

1.1 Research problem

Evidence suggests that merely offering interventions does not ensure effectiveness (Carroll et al., 2007). While intervention studies typically assume that participants meaningfully engage with and apply intervention components, empirical evidence shows substantial variability in how interventions are adopted and integrated into daily life (Durlak & DuPre, 2008). In this study intervention refers to the structured set of activities, materials and theoretical principles offered to participants. Adoption refers to the extent to which participants actively use, apply and integrate these components into their everyday behaviour. Effectiveness refers to the extent to which interventions lead to intended changes in participants' outcomes. Specifically, reductions in stress, physical and mental complaints and improvements in well-being, as measured over time.

Despite the centrality of adoption in determining intervention outcomes, many effectiveness studies treat it as a black box or control variable rather than a focal construct. As a result, it often remains unclear whether observed effects are attributable to the intervention itself or to differences in the degree to which participants adopt its components (Carroll et al., 2007). One of the most frequently named reasons for variability in the effectiveness of interventions is the degree of adoption by participants (Durlak & DuPre, 2008). Interventions with strong theoretical foundations may still fail if participants do not fully engage with or adopt the learned activities in their daily life (Carroll et al., 2007). By focusing on adoption as a core explanatory construct, this study contributes to intervention literature by advancing

understanding how variability in participant adoption relates to intervention outcomes in real-world settings.

Controlled interventions have repeatedly shown that health interventions can be effective under ideal conditions, often leading to measurable improvements in psychological and physical outcomes (Moore et al., 2015). However, these results do not always translate into real-world practice, where interventions are embedded in complex personal contexts. Contextual factors such as organizational culture, participant motivation and resource availability shape both the adoption of intervention components and their eventual effectiveness (Damschroder et al., 2009; Glasgow et al., 1999).

The difference between the effectiveness of interventions in controlled studies and realistic settings underscores a central challenge in health promotion research identifying which factors determine whether an intervention produces the desired effects outside of experimental environments (Fixsen et al., 2005).

1.2 Relevance

1.2.1 Theoretical relevance

Previous studies demonstrate that stress, health complaints and well-being can be influenced by interventions (Lamontagne et al., 2007; Richardson & Rothstein, 2008). However, the role of adoption extent as a predictor of these outcomes has been underexplored. Despite growing attention to implementation processes, many intervention evaluations still conceptualize participation as a uniform condition, implicitly assuming that participants are exposed to and engage with intervention components in similar ways (Proctor et al., 2013). This assumption overlooks heterogeneity in how individuals adopt intervention components into their daily work practices, particularly in complex, multi-component interventions implemented in real-world contexts. By explicitly examining individual-level adoption extent, this study contributes to contemporary intervention literature in several ways. First, it responds to recent calls in implementation science to move beyond average effectiveness estimates and to empirically examine implementation outcomes with explanatory mechanisms for intervention effects (Ceccarelli et al., 2024). Second, it advances stress and well-being intervention research by treating adoption as a continuous construct rather than a dichotomous indicator of participation, thereby offering a better understanding of why interventions may be effective for some participants but not for others (Ibrahim & Sidani, 2015). Third, by simultaneously examining multiple intervention components, this study addresses a key theoretical challenge identified in recent reviews of complex and multi-element interventions. Namely the difficulty

of disentangling differential uptake and its contribution to observed outcome variation (Taylor et al., 2014).

In doing so, this study bridges effectiveness-oriented intervention research with implementation-focused perspectives. Positioning adoption not merely as a methodological control variable but as a theoretically meaningful construct central to understanding variation in intervention outcomes related to stress, health complaints and well-being. This integrative approach can empirically demonstrate how differential adoption within a single intervention can help explain the effectiveness, thereby contributing to more precise theory-building and evaluation of health interventions.

1.2.2 Practical relevance

This study uses empirical data from Company X, a company which offers a multi-component intervention that aims to help individuals reduce chronic stress and enhance well-being by equipping participants with resources to recognize and interrupt unconscious stress responses. The intervention seeks to restore resilience, energy and overall quality of life.

For Company X, it remains unclear to what extent participants apply the intervention's components in their daily lives and how this variability affects outcomes. Without understanding these differences, it is difficult to determine whether observed effects are due to the intervention itself or to the degree of adoption by participants. Despite the promise of Company X's intervention, relatively little is known about how participants engage with its various elements. Key questions remain unanswered regarding the use and impact of these elements. It is still unclear to what extent the elements are adopted and how differences in the extent of adoption influence measurable effectiveness, such as stress reduction or improvements in well-being. This can result in interventions to appear less effective than they truly are, only because participants do not engage with them as intended (Durlak & DuPre, 2008). Therefore, understanding the influence of the extent to which participants adopt an intervention can reveal which elements are particularly powerful, which can offer valuable insights for optimization and scalability (Damschroder et al., 2009).

For Company X, insights into the link between adoption and outcomes are highly valuable. If stronger adoption is shown to be associated with greater improvements, this would support the need to encourage full and consistent participation among participants. The findings could guide adjustments in program design, communication and support strategies to increase adoption. Evidence from this study can shape best practices for ensuring that interventions do not just reach the participants, but are also effectively adopted to deliver meaningful impact.

1.3 Research question and objective

As it is important to investigate the link between adoption, the degree to which participants use the intervention as intended, and its effectiveness on outcomes such as stress level, physical and mental complaints and well-being of participants, the central research question guiding this study is:

RQ: What is the effect of the extent to which participants adopt Company X's intervention components on its effectiveness?

The objective of this study is to examine whether differences in participants' adoption of intervention components help explain variation in intervention outcomes. In doing so, this study seeks to contribute theoretically by advancing understanding of intervention effectiveness and practically, by providing actionable insights for improving Company X's intervention. By connecting adoption data with effectiveness measures, this research aims to provide actionable insights for researchers, practitioners and organizations interested in maximizing the impact of health interventions.

1.4 Outline

In order to answer the research question of this study, the following chapters are included. Chapter 2 develops the theoretical foundation of this study. It introduces the concept of interventions, intervention adoption and effectiveness and participants adoption and effectiveness. This is integrated into a conceptual model with corresponding hypotheses. Chapter 3 outlines the methodological approach, including the research design, data collection and sampling. Furthermore, the operationalisation of variables and the statistical analyses used to test the hypotheses. Chapter 4 presents the results of the statistical analyses. It reports the descriptive statistics, reliability and validity assessments and the outcomes of PROCESS analyses conducted to examine the relationships between intervention adoption and stress level, physical and mental complaints and well-being. Chapter 5 discusses these findings in light of existing literature, reflects on the theoretical and practical implications of the results. It also addresses the study's limitations and provides directions for future research.

Chapter 2: Theory

This chapter develops the theoretical framework of the study. It provides an overview of key concepts and theories related to interventions, intervention adoption and effectiveness. Drawing on insights from intervention theory and implementation science, the chapter elaborates on how multi-component interventions are expected to produce change and why variation in participants' adoption may lead to differences in outcomes. These perspectives are integrated into a conceptual model that specifies the hypothesized relationships. Between participants' adoption of intervention components and changes in stress level, physical and mental complaints and well-being.

2.1 Interventions

Intervention theory seeks to explain how and why an intervention leads to a particular outcome by specifying the mechanisms through which intervention activities are expected to influence participants (Rossi et al., 2004). Rather than viewing interventions as static treatments, contemporary intervention theory conceptualizes them as dynamic processes embedded in individual contexts (Pawson & Tilley, 1997; Skivington et al., 2021). A central assumption in modern intervention research is that interventions are often complex, meaning that they consist of multiple interacting components that target different mechanisms simultaneously (Craig et al., 2008; Skivington et al., 2021). Such components may address cognitive, emotional and behavioural factors. Understanding intervention effectiveness requires attention to how it is adopted by participants. Recent work underscores the importance of understanding processes of implementation and uptake, arguing that the theoretical specification of how components are intended to work improves interpretation of effectiveness outcomes (Moore et al., 2015; Sutcliffe & Kneale, 2025).

Understanding intervention effectiveness thus requires attention to how it is adopted by participants and stakeholders. Implementation science has made explicit the distinction between delivery of intervention content and adoption of that content, showing that variation in adoption is a key determinant of observed effects in multi-component interventions (Durlak & DuPre, 2008; Proctor et al., 2013). Process evaluations embedded within trials are increasingly recommended to unpack how adoption shapes outcomes (Bracci et al., 2025; Moore et al., 2015).

Multi-component interventions are defined as interventions that combine multiple components intended to influence outcomes through different mechanisms (Craig et al., 2008; Skivington et al., 2021). Such interventions are particularly prevalent in the domains of health

and well-being where single-component approaches are often insufficient to address the multifactorial nature of stress and health complaints (Montano et al., 2014; Nielsen & Randall, 2012). Company X offers such a multi-component intervention, comprising of seven components (AC-process, VBH, KR, JS, OO, PS and AT) that target awareness, self-regulation, cognitive-emotional processing and behavioural change. These components are further operationalised in chapter 3.

2.2 Intervention adoption and effectiveness

2.2.1 Intervention adoption

Within evaluation and change research, adoption is considered a central indicator of how effectively an intervention is delivered and experienced in practice (Durlak & DuPre, 2008). Adoption is defined as the active uptake and continued use of an intervention's practices, methods or principles by its intended users. It represents both the initial decision to use the intervention and the consistency with which participants continue to apply its components (Carroll et al., 2007).

High levels of adoption indicate that participants are not merely exposed to the intervention but actively internalize and enact its principles, thereby increasing the likelihood of achieving intended outcomes (Rossi et al., 2004). Conversely, partial or inconsistent adoption suggests that key elements are not sufficiently integrated, which may attenuate the expected outcomes (Proctor et al., 2013). In the literature on health and behavioural change programs, adoption has been emphasized as a critical intervention success (Craig et al., 2008; Glasgow et al., 1999). Studies show that variability in adoption often explains differences in program outcomes, as participants who engage more consistently tend to experience stronger benefits (Durlak & DuPre, 2008; Michie et al., 2011). In organisational and individual settings, adoption is viewed as a behavioural process that links exposure to the actual realization of the intended change (Damschroder et al., 2009). From this perspective, the adoption of Company X's intervention components reflects the behavioural realization of the intervention's goals. The extent to which participants adopt these components in daily life thus serves as a key determinant of the intervention's overall effectiveness.

2.2.2 Intervention effectiveness

The effectiveness of an intervention is typically defined as the extent to which it produces the desired outcomes in practice (Durlak & DuPre, 2008; Glasgow et al., 1999). In other words, effectiveness captures whether an intervention succeeds in translating its

theoretical assumptions and design into tangible improvements in the lives of its participants. This understanding emphasizes that effectiveness is not merely about whether an intervention is followed or received, but about whether it achieves the changes it was intended to generate. Effectiveness represents the crucial link between theory and social benefit, indicating whether an intervention's causal mechanisms function as expected in real-world settings (Rossi et al., 2004). Assessing effectiveness involves considerations of ecological and external validity, which mean whether the results obtained in practice align with the intervention's theoretical promises (Shadish et al., 2002). Effectiveness is outcome-oriented. It refers to the degree to which anticipated benefits, such as reduced stress level, lower physical and mental complaints and enhanced well-being, are actually realized in practice. By focusing on outcomes, effectiveness connects the logic of the intervention to its real-world impact, providing evidence of whether mechanisms of change hypothesized by its designers truly operate under conditions of every use (Carroll et al., 2007).

The effectiveness of an intervention depends not only on their design but also on the extent to which they are adopted as intended. Merely offering an intervention does not guarantee positive outcomes. The degree of adoption by participants may determine whether underlying mechanisms of change are activated (Carroll et al., 2007; Durlak & DuPre, 2008). In the context of Company X's interventions, participants may differ in how consistently they apply its various components in daily life.

2.3 Participants adoption and effectiveness

2.3.1 Participants' adoption and stress level

Stress arises when perceived demands exceed an individual's available resources (Bakker et al., 2007). Interventions that strengthen awareness, emotional regulation and recovery capacity provide valuable personal resources that buffer against such stress (S. Hobfoll, 1989). Company X's intervention is grounded in this principle, supporting participants to recognize automatic stress reactions and respond from calm and connection rather than from tension and control. This approach aligns with theories of self-regulation and mindfulness-based stress reduction, emphasizing conscious awareness and non-reactive attention as mechanisms to decrease physiological and psychological stress (Baumeister et al., 2007; Kabat-Zinn, 2003).

The extent to which these theoretical benefits are realized depends on how participants actually adopt the intervention's components in daily life. Merely being exposed to an intervention does not guarantee change. It is the depth, consistency and quality of engagement

that determine whether new patters of awareness and regulation are internalized (Rossi et al., 2004). Participants who actively practice the components and integrate them into challenging moments, are more likely to strengthen self-regulatory capacities and thus experience reduced stress.

Based on these theoretical foundations, it is expected that participants who adopt the intervention's components more extensively will show greater reductions in perceived stress levels. Therefore, the first hypothesis of this study is the following:

H1: A higher adoption of intervention components (AC-process, VBH, KR, JS, OO, PS, AT) is associated with a decrease in stress level

2.3.2 Participants' adoption and physical and mental complaints

Physical and mental complaints often arise from prolonged imbalance between bodily strain and recovery (McEwen, 1998). Physical complaints may manifest as fatigue, pain, muscle tension, sleep problems or concentration difficulties. Psychological factors, including worry, irritability and exhaustion can further worsen these symptoms (van der Klink et al., 2001). Interventions that promote awareness, emotional regulation and self-care behaviours can help prevent or reduce these complaints by supporting recovery processes and restoring physiological balance (Gross, 2002). Company X's intervention addresses these mechanisms by teaching participants to recognize tension-related patterns, calm the nervous system and cultivate mental clarity and openness.

The extent to which these restorative processes occur depend on how participants adopt and integrate the intervention components into their daily routines. Theoretical models of behaviour change emphasize that consistent, mindful engagement is required for physiological and psychological adaptation to take place (Bandura, 1991; Ryan & Deci, 2001). Participants who actively apply the exercises, monitor bodily signals and consciously implement relaxation or reframing techniques are more likely to interrupt tension cycles and support recovery (McEwen & Gianaros, 2011). The quality and depth of adoption determine whether the intended improvements in physical and mental functioning are realized.

Therefore, higher adoption of each component group is expected to be related to stronger decreases in physical and mental complaints over time. The following hypothesis is therefore formulated:

H2: A higher adoption of intervention components (AC-process, VBH, KR, JS, OO, PS, AT) is associated with a decrease in physical and mental complaints

2.3.3 Participants' adoption and well-being

Well-being reflects not only the absence of complaints, but the presence of positive psychological functioning and vitality (Diener et al., 1999; Ryff & Singer, 2008). It involves living with balance, energy and a sense of meaning. The intervention of Company X is explicitly aimed at helping participants regain control over their lives. Meaning to live with greater calm, clarity and authenticity rather than being driven by stress or automatic patterns. This resonates with principles of eudaimonic well-being that emphasize self-realization, purpose and authenticity (Huta & Ryan, 2010; Ryan & Deci, 2001). Through the approach of Company X, the adoption of intervention components can enhance well-being through multiple pathways.

Achieving such improvements depends on how participants internalize and apply the intervention's principles. Theories of sustained behaviour change highlight that well-being benefits emerge from their repeated, mindful integration into daily life (Lyubomirsky & Layous, 2013; Ryan & Deci, 2008). Participants who consciously engage with the exercises are more likely to strengthen autonomy, competence and relatedness. This forms the foundation for lasting increases in well-being.

Therefore, participants who more extensively adopt the intervention's components are expected to experience greater increases in well-being over time. The following hypothesis is accordingly formulated:

H3: A higher adoption of intervention components (AC-process, VBH, KR, JS, OO, PS, AT) is associated with an increase in well-being

2.4 Coping capacity

Although higher adoption of intervention components is expected to improve outcomes, prior research suggests that intervention effects are rarely uniform across individuals. The extent to which adoption translated into improved outcomes may depend on individual characteristics that shape how participants utilize and benefit from the intervention. Therefore, next to adoption of intervention components, individual differences in coping capacity may influence how participants benefit from an intervention. Coping capacity refers to individuals' perceived ability to manage stressors and regulate negative emotions (Lazarus & Folkman, 1984). Contemporary stress research continues to emphasize that stress outcomes are shaped

not only by external demands but by the availability and activation of personal resources that enable adaptive, personal resources facilitate the effective utilization of newly acquired skills and strategies (Hobfoll, 2001). In the context of a multi-component intervention, the translation of adoption into improved outcomes may depend on participants' pre-existing coping capacity. Individuals with higher coping capacity are expected to more effectively integrate and sustain the application of intervention strategies, thereby strengthening their impact on stress reduction, physical and mental complaints and well-being. Within multi-component interventions, outcomes emerge from the interaction between intervention mechanisms and participants' personal and contextual conditions (Durlak & DuPre, 2008; Pawson & Tilley, 1997; Skivington et al., 2021). Similarly, occupational health intervention research highlights that individual differences influence how participants benefit from stress-reduction programs (Joyce et al., 2016; Nielsen & Miraglia, 2017). Coping capacity can be conceptualized as a key individual-level condition that shapes the strength of the relationship between adoption and outcomes (Hobfoll, 2001). Consequently, coping capacity is expected to amplify the positive effects of adoption on intervention outcomes. Participants with higher coping capacity are more likely to translate adoption into measurable improvements in stress level, physical and mental complaints and well-being. Therefore, coping capacity is considered as a potential moderator in the relationship between adoption of intervention components and stress level, physical and mental complaints and well-being.

H4: Coping capacity moderates the relationship between the adoption of intervention components (AC-process, VBH, KR, JS, OO, PS, AT) and intervention outcomes (stress level, physical and mental complaints, and well-being), such that the relationship is stronger for participants with higher coping capacity

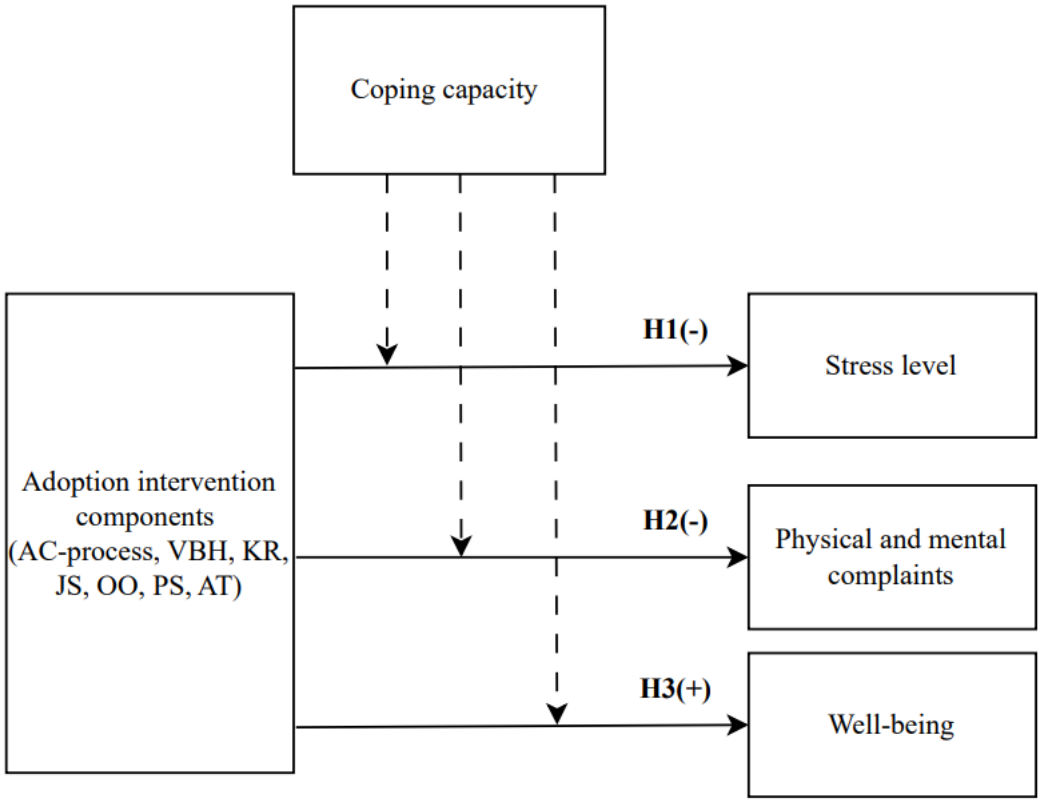
2.5 Conceptual model

The conceptual model presented in figure 1 illustrates the hypothesized relationships between participants' adoption of the intervention components and intervention effectiveness, while incorporating coping capacity as a moderating variable. The model includes seven distinct intervention components (AC-process, VBH, KR, JS, OO, PS and AT), each representing a specific mechanism through which Company X facilitates change. The model proposes that a higher level of adoption of these intervention components is associated with greater reductions in stress levels (H1) and physical and mental complaints (H2), as well as stronger increases in well-being (H3). Negative signs (-) indicate expected decreases in stress

level and physical and mental complaints when there is an increase in adoption of the intervention components. Whereas positive signs (+) reflect expected increases in well-being when there is an increase in adoption of the intervention components.

In addition to these direct effects, coping capacity is incorporated as moderator. This implies that the strength of the relationship between adoption of intervention components and the outcome variables may depend on participants perceived ability to manage stressors and regulate negative emotions. Specifically, it is expected that the positive effects of adoption will be stronger for participants with higher levels of coping capacity. Age, gender and educational level are included as control variables to account for potential demographic influences on the outcome variables.

Figure 1 Conceptual model



Note. Age, gender and educational level are included as control variables

Chapter 3: Methods

The methodology of this study outlines the procedures used to examine how the extent to which participants adopt the components of Company X's intervention relates to its effectiveness. This chapter describes the research design, the data collection process and sampling procedures. Furthermore, it outlines the operationalisation of all variables and the analytical strategy used to test the hypotheses derived from the conceptual model.

3.1 Company X's intervention

Company X developed an intervention that targets goals through multiple components. The intervention is designed to equip participants with resources for coping with demands, preventing stress and fostering positive well-being outcomes. The overarching goal of Company X's intervention is to help individuals break free from chronic stress patterns that undermine their health and well-being. Their mission is to restore resilience and vitality by teaching participants to recognize and interrupt unconscious stress responses. Thereby enabling them to experience a sustainable improvement in energy, health and quality of life.

The different parts of adoption of the intervention used in this study are the Alexander Concept (AC) process components, the Verbonden Brein-Houding (VBH) components, the Korte Route (KR) components, the Juiste Staat (JS) components, the Overtuigingen Omzetten (OO) components, the Positief Selecteren (PS) components and the Actieve Taal (AT) components. The AC-process components focus on awareness and self-regulation, guiding participants to recognize stress patterns and develop more conscious responses. The VBH components emphasize cultivating a connected and calm mindset that fosters emotional balance, resilience and healthy functioning. The KR components offer a practical method to quickly move from stress activation toward calm awareness. The JS components help participants to consciously shift into a mental and physical state that supports openness, focus and well-being. With the OO components, participants identify and transform limiting beliefs into more supportive and realistic ones. The PS components train participants to consciously direct attention toward what is going well, cultivating gratitude and reinforcing constructive thought patterns that foster motivation and resilience. The AT components focus on using language in an empowering way, encouraging self-expression that reflects choice, agency and responsibility. The aim of offering these components is to induce change in patterns and behaviour in order to reduce stress and improve wellbeing.

3.2 Research design, data collection and sampling

This study employed a quantitative research design to examine the relationship between participants' adoption of Company X's intervention components and the intervention's effectiveness. The conceptual model specifies three hypotheses that link the extent of adoption of seven types of intervention components to three outcome variables representing the intervention's effectiveness. The purpose of this design is to investigate whether a higher degree of adoption of specific intervention components is associated with more favourable changes in these outcomes. Company X's intervention aims to improve health and well-being among individuals with chronic complaints, offering a relevant context to investigate whether stronger adoption of learned strategies enhances intervention effectiveness.

The data was collected through an online survey at two time points (baseline and follow-up), designed and distributed by Company X as part of their routine intervention monitoring. The baseline measurement is before the individuals participate in the intervention and the follow-up is 3 months after the participants complete the intervention. The core of the intervention consists of a three-day training program delivered on site. The research design can be characterized as longitudinal and non-experimental. Participants provided informed consent for the use of their anonymized data for research purposes. All data were provided in an anonymized format using registration codes and contained no personally identifiable information. The dataset was securely stored and analysed in accordance with ethical research standards. This study relies on previously collected secondary data.

The dataset contains responses from participants who completed the intervention of Company X. Each respondent provided self-reported data on health, intervention engagement, behavioural changes and behavioural outcomes. After cleaning and excluding incomplete responses, the analytical sample consisted of $N= 85$ participants.

3.3 Measures

This section outlines the variables used in this study, including their operationalisation, corresponding questionnaire items and answer categories. The measures consist of seven independent variables representing the extent of adoption of different intervention components. In addition, there are three dependent variables capturing effectiveness outcomes in terms of stress, physical and mental complaints and well-being. An overview of all variables and their respective questionnaire items is presented in Appendix A.

3.3.1 Independent variables: adoption of the intervention components

The extent of adoption was operationalized as the degree to which participants applied different components of Company X's intervention in daily life. In Appendix A this operationalisation is presented, where seven independent variables each represent a distinct component of the intervention. Across these components, participants reported either the degree or frequency of use, using response scales ranging from 0-100 or 0-250 depending on the item. These variables reflect how extensively participants engaged with each component of the intervention in their daily lives. For example, adoption of the AC-process component was measured by the question: ''*Approximately, how many times have you completed the 'AC-process' (since the last time you completed this questionnaire)?''* Adoption of for example the AT component was assessed by the question: ''*To what extent have you integrated the AT component into your daily communication?''*

3.3.2 Dependent variables: effectiveness outcomes

The effectiveness of the intervention was assessed through three dependent variables. Each dependent variable was measured at two time points (T0 baseline and T1 follow-up) and change scores were computed (T1-T0). Negative values on stress and complaints indicate improvement, while positive values on well-being reflect enhancement. The dependent variables represent changes in stress, physical and mental complaints and overall well-being. Stress was measured with seven items assessing common stress symptoms on a 1-4 Likert scale. Physical and mental complaints were captured through twelve items reflecting the frequency of various symptoms, rated on a 0-100 scale. Well-being was measured with nine items on a 1-7 Likert scale, with two reverse-scored items recoded before analysis. These scales provide a comprehensive assessment of participants' functioning over time. For example, a stress level items contained the questions: ''*I tended to overact to situations''* and ''*I noticed that I was easily upset''.* The physical and mental complaints items contained the questions: ''*Fatigue and/or tiredness''* and ''*Headache and/or dizziness''.* The well-being items contained the questions: ''*Within the possibilities available to me, I lead the life I want to live''* and a reversed coded question: ''*Something or someone prevents me from doing what I want to do in life''.*

3.3.3 Moderator: coping capacity

Coping capacity was measured using six items assessing behavioural and cognitive coping abilities at baseline (T0). Including active problem solving, help-seeking, positive thinking and positive reappraisal. Responses were given on a 0-100 scale, with higher scores

indicating greater coping capacity. Examples of the questions asked are: ‘‘*If I find it difficult to change a situation that is important to me, then: I resign myself to it and accept it – I keep fighting, even if it costs me a lot’’* and ‘‘*If I have problems then: I think about all the misery associated with them – I think about something pleasant that cheers me up’’.* A composite score was created by mean-averaging the items. In Appendix A the overview of the questions is presented.

3.3.4 Control variables: demographics

Next to the focal variables in this study, several demographic characteristics were included as control variables. Previous research has shown that demographic factor such as age, gender and educational level are systematically related to stress level, physical and mental complaints and well-being, independent of intervention exposure (Lamontagne et al., 2007; Nielsen & Randall, 2012). These characteristics may therefore influence outcome levels regardless of the extent to which participants adopt the intervention components. To ensure that the relationships between participants’ adoption of the intervention components and stress level, physical and mental complaints and well-being are not confounded by background characteristics. Age, gender and educational level were included as control variables in the analyses. By controlling for these variables, this study aims to isolate the unique contribution of adoption of the intervention components to intervention effectiveness. Gender, age and educational level were assessed at baseline (T0). Gender was measured by asking participants to indicate the category with which they most strongly identified. Age was measured using predefined age categories. Educational level was assessed as the highest completed level of education. All demographic variables were entered as control variables in the first step of the regression analysis. In Appendix A the overview of the control variable questions is presented.

3.4 Data analysis

Prior to analysis, data from the questionnaire was screened for completeness, accuracy and outliers. Participants with missing baseline or follow-up scores on key variables were excluded from hypothesis testing. To test the four hypotheses derived from the conceptual model, three regression models were analysed by using PROCESS analyses for each separate outcome variable. Each analysis examined whether the degree of adoption of the seven intervention components predicted the extend of change between baseline and follow-up, while using control variables and moderator. All statistical analyses were performed using IBM SPSS Statistics (Version 30). With a significance level of $p < .05$ (Hair et al., 2019). Moderation analyses were conducted using Hayes’ PROCESS macro for SPSS (Hayes, 2017).

Chapter 4: Results

This chapter presents the results of the statistical analyses conducted to examine the relationship between the extent to which participant adopted the intervention components and changes in stress level, physical and mental complaints and well-being. It outlines the data preparation, preliminary analyses, descriptive statistics, assumption testing and the multiple regression analyses.

4.1 Data preparation

Prior to the analyses, the dataset was screened for missing values, inconsistencies and incorrect coding. Reverse coded items in the well-being scale (Q164 and Q165) were recoded before further analyses. Participants with missing data on either baseline (T0) or follow-up (T1) outcome measures were excluded. After data cleaning, the final analytical sample consisted of *N=85* participants, reduced from an initial dataset of 111 respondents.

4.2 Preliminary analyses

4.2.1 Factor analysis

To examine the dimensionality of the scales used in this study, exploratory factor analyses were conducted at baseline (T0). Factor analyses were performed separately for each construct to avoid mixing conceptually distinct measures and to ensure clarity of the underlying structure. Principal axis factoring was used as the extraction method, as the goal was to identify latent constructs underlying the observed items. Based on theoretical considerations and inspection of the scree plots, one-factor solutions were retained for each scale.

An exploratory factor analysis (principal component analysis) was conducted on the stress items (Q78-Q84). The data were suitable for factor analyses (KMO = .609; Bartlett's test of sphericity $p < .001$). The initial one-factor solution explained 31.59% of the variance. Inspection of factor loading indicated that Q79 (.352), Q81 (.376) and Q84 (.186) loaded low on the factor and were therefore removed. A second PCA on the remaining items (Q78, Q80, Q82, Q83) supported a one-factor structure (KMO = .688; Bartlett's test of sphericity $p <.001$), explaining 51.27% of the variance. In the Appendix B the factor loadings for the stress scale are presented with the final solution.

An exploratory factor analysis (principal component analyses) was conducted on the physical and mental complaints items (Q42-Q53). The data was suitable for factor analysis (KMO = .727; Bartlett's test of sphericity $p <.001$). The initial one-factor solution explained 22.68% of the variance. Inspection of factor loading indicated that item Q45 showed a very low

loading (.191) and was removed. A second PCA with the remaining items (Q42-Q44, Q46-Q53) supported a one-factor structure (KMO = .752; Bartlett's test of sphericity p <.001). The extracted factor accounted for 24.41% of the variance. In Appendix B the factor loadings for the physical and mental complaints scale are presented with the final solution.

An exploratory factor analysis (principal components analysis) was conducted for the well-being scale items (Q163-Q171). The initial analysis was suitable for factor analysis (KMO = .889, Bartlett's test of sphericity p <.001). The initial one-factor solution explained 45.18% of the variance. However, two items (Q165 and Q170) showed negative loadings, these items were removed prior to scale construction. A second PCA with the remaining items (Q163, Q164, Q166 – Q171) supported a one-factor structure (KMO = .891; Bartlett's test of sphericity p <.001). The extracted factor accounted for 47.31% of the variance. In Appendix B the factor loadings for the well-being scale are presented with the final solution.

An exploratory factor analysis (principal components analysis) was conducted for the coping capacity items (Q235-245). The initial analysis was suitable for factor analysis (KMO = .656; Bartlett's test of sphericity p <.001). The initial one-factor solution explained 15.6% of the variance. However, five items (Q236, Q238, Q243, Q244, Q245) showed negative loadings and one item (Q240) showed a low loading (.248), these items were removed prior to sale construction. A second PA with the remaining items (Q235, Q237, Q239, Q241, Q242) supported a one-factor structure (KMO = .708; Bartlett's test of sphericity p <.001). The extracted factor accounted for 26.58% of the variance. In Appendix B the factor loadings for the coping capacity scale are presented with the final solution.

4.2.2 Reliability analyses

Following the factor analyses, the reliability of the refined scales was assessed using Cronbach's Alpha at baseline (T0). Reliability analyses were conducted only at T0, as the scales were assumed to be stable over time and identical item compositions were applied at follow-up (T1). Cronbach's alpha values indicated acceptable internal consistency for the majority of the scales ($\alpha \geq .70$) In cases where alpha could not be reliably estimated due to missing data across items, scale construction proceeded based on theoretical justification and factor-analytic results as there were no possibilities to improve Cronbach's alpha when deleting items. An overview of the reliability of the outcome items is shown in Appendix C.

The stress scale (Q78, Q80, Q82, Q83) showed questionable reliability (α = **.**681; 4 items). The physical and mental complaints scale (Q42-44, Q46-53) showed acceptable reliability (α = .761; 11 items). Well-being items (Q163-164, Q166-169, Q171) showed a good

reliability (α = .830; 7 items). The coping capacity items (Q235, Q237, Q239, Q241, Q242) showed questionable reliability (α = **.**607; 5 items).

4.2.3 Scale construction and change scores

For each construct, scale scores were computed by calculating the mean of the corresponding items. Mean scores were preferred over sum scores to retain cases with partially missing data and to ensure comparability across participants. Scale scores were computed separately for baseline (T0) and follow-up (T1) using the final item sets resulting from the factor and reliability analyses.

To assess change over time, change scores were calculated for each outcome variable by subtracting baseline (T0) scores from follow-up (T1) scores. These change scores served as the dependent variables in the subsequent regression analyses. Following these steps, all variables were prepared for hypothesis testing. The final dataset consisted of validated and reliable scale scores at two time points. As well as corresponding change scores reflecting individual differences in intervention-related change.

4.3 Descriptive statistics and correlations

Descriptive statistics are presented table 1 and 2. The sample (N=85) consisted of 44 men (51.8%) and 41 women (48.2%). The age distribution of the sample showed that most participants were between 46-50 years (16.5%) and 56-60 years (16.5%). A substantial proportion was aged 51-55 years (12.9%) and 31-40 years (11.8%). Smaller groups were represented in the younger (16-30 years) and older categories (71 years and above). Regarding educational level, the majority of the participants were highly educated. Almost half of the sample held a university degree (47.1%), followed by participants with a higher professional education (HBO) degree (32.9%). On average participants showed a decrease in stress levels over time (M = -18.96, SD = 21.09) as well as a decrease in physical and mental complaints (M = -22.97, SD 18.57). Well-being increased on average between baseline and follow-up (M = 19.42, SD = 14.10). These findings indicate an overall favourable change in outcomes following participation in the intervention. With regard to the independent variables, substantial variation was observed in the degree of adoption across the intervention components. While mean scores indicate moderate levels of adoption overall, the relatively high standard deviations for several components (VBH, SD=63.12; PS, SD=52.55; OD, SD=52.55 and OO, SD=41.52) suggest considerable heterogeneity in participants' engagement with these elements of the intervention.

Table 1

Demographic characteristics

Variable	n	%
Gender		
Men	44	51.8
Women	41	48.2
Age		
16–20	2	2.4
21–25	4	4.7
26–30	3	3.5
31–40	10	11.8
46–50	14	16.5
51–55	11	12.9
56–60	14	16.5
61–65	8	9.4
66–70	8	9.4
71–75	2	2.4
76–80	7	8.2
81–85	2	2.4
Educational level		
Primary education	1	1.2
HAVO	7	8.2
VWO/Gymnasium	1	1.2
MBO	8	9.4
HBO	28	32.9
University	40	47.1

Table 2

Descriptive statistics of study variables (N=85)

Variable	M	SD	Min	Max
Adoption components				
AC-process	62.08	24.09	1	100
VBH	72.84	63.13	3	250
KR	63.93	27.58	6	100
JS	61.08	27.58	4	250

OO	31.35	41.52	1	250
PS	41.28	52.55	1	250
AT	6.58	2.31	2	10
Outcome variables				
Stress level	-18.96	21.09	-75	33
Physical and mental complaints	-22.97	18.57	-76	19
Well-being	19.42	14.10	-9	52
Moderator				
Coping capacity	47.38	16.08	10	97

Note. Outcome variable scores were calculated as follow-up (T1) minus baseline (T0). Negative values indicate a reduction in stress and complaints, whereas positive values indicate an increase in well-being.

The correlations are presented in table 3, which shows the Person correlations among the study variables. The intervention components were moderately to strongly positively intercorrelated indicating that participants who adopted one component were generally more likely to adopt others. Several adoption components were negatively associated with physical and mental complaints, particularly AC-process (r=-.36, p<.01) and AT (r=-.29, p<.01). All correlations were below .80, indicating no indications of severe multicollinearity. Multicollinearity diagnostics were further examined in the analyses using tolerance and VIF statistics.

Table 3

Pearson correlations among study variables (N=85)

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. AC-process	—													
2. VBH	.46**	—												
3. KR	.34**	.05	—											
4. JS	.26*	.40**	.54**	—										
5. OO	.24*	.29**	.19	.42**	—									
6. PS	.24*	.34**	.14	.54**	.70**	—								
7. AT	.46**	.22*	.40**	.21	.24*	.14	—							
8. Coping Capacity	.01	.10	.08	.08	.18	.15	.10	—						
9. Stress Level	-.04	-.02	-.11	-.09	-.04	-.14	-.20	-.09	—					
10. Physical & Mental Complaints	-.36**	-.07	-.34**	-.27*	-.20	-.17	-.29**	-.10	.40**	—				
11. Well-being	.26*	.07	.13	.04	-.02	.07	.16	.07	-.39**	-.40**	—			
12. Gender	-.11	-.07	.06	.22*	-.13	-.12	-.05	-.10	.09	.10	.02	—		
13. Age	.01	-.11	.08	.01	.06	.12	.08	.23*	-.23*	-.04	.02	.01	—	
14. Educational Level	-.01	-.05	-.02	-.16	.01	-.13	-.07	.15	.10	-.04	-.08	-.02	.25*	—

Note. values represent Pearson correlation coefficients (two-tailed). *p < *.05.* ** p < *.01.*

4.4 Assumptions testing

Prior to conducting the moderation analyses, the assumptions of multiple regression were examined. Because a total of 21 moderation models were estimated (seven adoption components x three outcome variables), assumption testing was conducted per outcome variable using one representative regression model that reflected the structure of the PROCESS analyses.

The representative models included one focal adoption component (AC-process), coping capacity, their interaction term, the remaining adoption components as covariates and the demographic control variables (age, gender and educational level). As all adoption components were treated as equally important in the analyses, the focal component used for assumption diagnostics was selected arbitrarily.

Appendix D presents the results of the assumption tests. Multicollinearity was not a concern, as tolerance values exceeded .34 and VIF values ranged between 1.14 and 2.88. Durbin-Watson statistics ranged from 1.52 to 1.95 across the three outcome variables, indicating independence of errors. Inspection of standardized residuals revealed no influential cases. Visual inspection of the scatterplots of standardized residual against standardized predicted values indicated no substantial deviations from linearity or homoscedasticity. Residuals were approximately normally distributed. As the diagnostic results were comparable across outcome variables, the assumptions were considered satisfied for all moderation models.

4.5 Analyses

To examine whether coping capacity moderated the relationship between adoption of the intervention components and intervention outcomes, a series of moderation analyses were conducted using PROCESS Model 1 (Hayes, 2017). For each outcome (stress level, physical and mental complaints and well-being), seven separate models were estimated. In each model, one intervention component was entered as the independent variable (X), coping capacity as the moderator (W) and the remaining intervention components as well as demographic variables (age, gender, education) were included as covariates. Unstandardized coefficients, significance levels and changes in explained variance were examined.

4.5.1 Stress level

Table 4 presents the result of seven moderation models (PROCESS Model 1), in which each intervention component was separately tested as predictor of stress level with coping capacity as moderator. Across all models predicting stress level, none of the intervention

components significantly predicted stress after controlling for the remaining components and demographic variables (all p-values >.12). Coping capacity itself was also not a significant predictor of stress in any of the models (all p-values >.80). Age showed a marginal negative association with stress in several models (p<.10) suggesting that older participants tended to report slightly lower stress levels. Gender and education were not significant predictors. These findings indicate that higher adoption of the intervention components was not associated with reductions in stress level. Therefore, hypothesis 1 was not supported.

None of the interaction terms between adoption components and coping capacity were statistically significant (all p-values >.16). The additional explained variance due to the interaction terms was negligible (ΔR^2 ranging from .000 to .023). Thus, coping capacity did not moderate the relationship between adoption and stress level. Hypothesis 4 was therefore not supported for stress level.

Table 4

Moderation analyses predicting stress level (PROCESS Model 1)

Predictor (X)	**b (X)**	**p (X)**	**b (X × CopCap)**	**p (Interaction)**	**ΔR^2**
ACProc	0.097	.459	−0.003	.607	.003
VBH	0.000	.998	−0.000	.925	.000
KR	−0.024	.838	−0.002	.751	.001
JS	−0.016	.813	−0.003	.243	.016
OO	0.000	.997	0.006	.166	.023
PS	−0.059	.415	0.002	.546	.004
AT	−1.870	.126	−0.010	.883	.000
Control variable	**b**	**p**			
Age	-0.118	.047	-	-	-
Gender	0.284	.436	-	-	-
Education	-0.094	.219	-	-	-

Note. Each row represents a separate moderation model estimated using PROCESS model 1. In each model, one intervention component was entered as the independent variable (X), coping capacity as the moderator (W) and the remaining intervention components together with the demographic variables (age, gender, education) were included as covariates. Unstandardized coefficients are reported. ΔR^2 indicates the increase in explained variance due to the interaction term.

4.5.2 Physical and mental complaints

Table 5 presents the results of seven moderation models (PROCESS Model 1), in which each intervention component was separately tested as a predictor of physical and mental complaints with coping capacity as moderator. For physical and mental complaints, significant main effects were observed for two intervention components, while controlling for the remaining components and demographic variables. Higher adoption of the AC-process component was associated with lower levels of complaints (b = -0.214, p = .032). Additionally, adoption of the AT component was significantly negatively related to complaints (b = -2.438, p=.021). The remaining intervention components were not significant predictors (all p-values > .09). Coping capacity did not show a significant direct effect on complaints in any of the models. These findings indicate that higher adoption of specific intervention components (AC-process and AT) was associated with fewer physical and mental complaints. Therefore, hypothesis 2 was partially supported.

None of the interaction terms between adoption components and coping capacity were statistically significant (all p-values >.37). The interaction effects explained minimal additional variance in complaints (ΔR^2 ranging from .000 to .010). Consequently, coping capacity did not moderate the relationship between adoption and physical and mental complaints. Hypothesis 4 was not supported for this outcome.

Table 5

Moderation analyses predicting physical and mental complaints (PROCESS Model 1)

Predictor (X)	b (X)	p (X)	b (X × CopCap)	p (Interaction)	ΔR^2
ACProc	−0.214	.032	−0.006	.482	.006
VBH	0.018	.742	−0.001	.877	.000
KR	−0.133	.091	−0.005	.619	.002
JS	−0.061	.311	−0.003	.547	.004
OO	0.027	.685	0.004	.371	.010
PS	−0.103	.143	0.003	.524	.004
AT	−2.438	.021	−0.058	.409	.008
Control variables	**b**	**p**			
Age	-0.142	.028	-	-	-
Gender	0.517	.318	-	-	-
Education	-0.101	.184	-	-	-

Note. Each row represents a separate moderation model estimated using PROCESS Model 1. In each model, one intervention component was entered as the independent variable (X), coping capacity as the moderator (W), and the remaining intervention components together with demographic variables (age, gender, education) were included as covariates. Unstandardized coefficients are reported. ΔR² indicates the increase in explained variance due to the interaction term.

4.5.3 Well-being

Table 6 presents the results of seven moderation models (PROCESS Model 1), in which each intervention component was separately tested as a predictor of well-being with coping capacity as moderator. For well-being, none of the adoption components significantly predicted well-being after controlling for the remaining components and demographic variables (all p-values >.18). Coping capacity was also not a significant direct predictor of well-being in the moderation models. These findings indicate that higher adoption of intervention components was not significantly associated with increased well-being. Therefore, hypothesis 3 was not supported.

None of the interaction terms between adoption components and coping capacity were statistically significant (all p-values >.29), and the interaction effects explained only negligible additional variance in well-being (ΔR^2 ranging from .000 to .012) Thus, coping capacity did not moderate the relationship between adoption and well-being. Hypothesis 4 was not supported for well-being.

Table 6

Moderation analyses predicting well-being (PROCESS Model 1)

Predictor (X)	b (X)	p (X)	b (X × CopCap)	p (Interaction)	ΔR²
ACProc	0.041	.611	0.004	.486	.006
VBH	−0.015	.756	0.001	.854	.000
KR	0.082	.241	0.006	.463	.007
JS	0.054	.289	0.003	.511	.005
OO	−0.012	.861	−0.005	.298	.012
PS	0.063	.350	−0.002	.628	.003
AT	1.103	.184	0.037	.567	.004
Control variables	**b**	**p**			
Age	0.126	.036	-	-	-

Gender	-0.301	.492	-	-	-
Education	0.112	.148	-	-	-

Note. Each row represents a separate moderation model estimated using PROCESS Model 1. In each model, one intervention component was entered as the independent variable (X), coping capacity as the moderator (W), and the remaining intervention components together with demographic variables (age, gender, education) were included as covariates. Unstandardized coefficients are reported. ΔR^2 indicates the increase in explained variance due to the interaction term.

Table 7 provides an overview of the hypotheses and indicates whether they are supported, partially supported or not supported.

Table 7

Hypothesis	Statement	Supported?
H1	A higher adoption of intervention components (AC-process, VBH, KR, JS, OO, PS, AT) is associated with a decrease in stress level.	Not supported
H2	A higher adoption of intervention components (AC-process, VBH, KR, JS, OO, PS, AT) is associated with a decrease in physical and mental complaints.	**Partially supported**
H3	A higher adoption of intervention components (AC-process, VBH, KR, JS, OO, PS, AT) is associated with an increase in well-being.	Not supported
H4	Coping capacity moderates the relationship between the adoption of intervention components and intervention outcomes (stress level, physical and mental complaints, and well-being), such that the relationship is stronger for participants with higher coping capacity.	Not supported

Chapter 5: Discussion & Conclusion

The aim of this study was to examine whether the extent to which participants adopt the components of Company X's multi-component intervention influences its effectiveness in terms of stress level, physical and mental complaints and well-being. By positioning adoption as a central explanatory construct rather than as a background implementation variable, this study responded to calls in intervention and implementation research to move beyond average effectiveness estimates and to better understand why interventions may work differently across participants.

The findings reveal a differentiated and outcome-specific pattern. Although participants on average reported reductions in stress and physical and mental complaints, and increases in well-being between baseline and follow-up, the extent of adoption explained only part of this improvement. More specifically, higher adoption of the AC-process component was significantly associated with greater reductions in physical and mental complaints. In addition, adoption of the AT component showed a significant negative association with physical and mental complaints in the analyses. However, adoption of the intervention components did not significantly predict changes in stress level or well-being when all components were considered simultaneously. Furthermore, coping capacity did not moderate the relationship between adoption and any of the three outcomes.

These findings suggest that adoption plays a meaningful, yet selective role in explaining intervention effectiveness. The relationship between adoption and outcomes is neither uniform across components nor consistent across outcome domains. Instead, adoption appears to influence specific mechanisms that are more directly connected to reductions in physical and mental complaints than to perceived stress level or well-being.

5.1 Answering the research question

The central question guiding this study was: *What is the effect of the extent to which participants adopt Company X's intervention components on its effectiveness?* Based on the findings, this question can be answered in a nuanced manner. The extent to which participants adopt the intervention components influences effectiveness selectively. Stronger adoption of specific components, particularly the AC-process and AT components, is associated with greater reductions in physical and mental complaints. However, adoption does not significantly predict changes in stress level or well-being. Additionally, coping capacity does not strengthen the relationship between adoption and outcomes.

Thus, adoption matters, but not universally. Its explanatory power is outcome-dependent and component-specific. These results indicate that behavioural engagement with certain elements of the intervention contributes to improvements in physical and mental complaints, yet adoption alone does not account for improvements in perceived stress or well-being. Intervention effectiveness therefore cannot be reduced to a simple linear function of adoption intensity.

5.2 Theoretical implications

The findings of this study invite a more nuanced reconsideration of how adoption functions within complex intervention frameworks. Rather than supporting a linear assumption that more adoption leads to better outcomes, the results suggest that the relationship between adoption and effectiveness is conditional upon the type of mechanism targeted and the nature of the outcome examined. This contributes to contemporary intervention theory by illustrating that multi-component interventions should not be conceptualized as additive bundles of equally potent elements. Instead, components may differ in their proximity to specific outcome domains and in the mechanisms through which they operate.

The significant associations between adoption of the AC-process and AT components and reductions in physical and mental complaints suggest that components targeting immediate cognitive-emotional interruption and linguistic reframing may activate relatively proximal self-regulatory mechanisms. From a conservation of resources perspective (Hobfoll, 1989; Hobfoll, 2001), such mechanisms may interrupt ongoing resource depletion cycles at the level of appraisal and response selection, thereby reducing physiological strain. Techniques that operate at this proximal level may directly influence stress-related symptomatology without altering broader contextual stressors.

In contrast, the absence of significant effects for stress level and well-being indicates that these constructs may be shaped by a more distal and structural determinants. Stress perceptions are closely embedded in environmental demands and role pressures (Bakker & Demerouti, 2007). Which may not be fully offset through behavioural enactment alone. Similarly, well-being reflects processes of meaning-making, life satisfaction and psychological integration (Diener et al., 1999; Ryff & Singer, 2008). Which typically require sustained internalization rather than repeated technique activation. Intervention theory further suggests that surface-level engagement does not automatically translate into deeper transformation (Durlak & DuPre, 2008; Pawson & Tilley, 1997).

These findings therefore challenge overly behaviour-centric models of intervention effectiveness. When adoption is operationalized primarily as frequency or extent of use, it may capture engagement but not necessarily internalization. In line with self-determination theory (Deci et al., 2017), repeated enactment does not automatically lead to autonomous integration. This distinction implies that future research should differentiate between behavioural activation of components and qualitative internalization processes, as they may predict different outcome domains.

Furthermore, the absence of moderation by coping capacity raises theoretical questions regarding the assumed amplifying role of personal resources. Resource-based models propose that individuals with stronger coping capacities are better positioned to convert intervention inputs into beneficial outcomes (Hobfoll, 2001). However, the present findings suggest either that the intervention components are accessible regardless of coping levels or that coping capacity operates as an independent resilience factor rather than as a multiplicative moderator. This findings aligns with implementation research indicating that individual differences do not always condition effectiveness in linear or predictable ways (Skivington et al., 2021).

5.3 Practical implications

From a practical perspective, the findings provide some insights for Company X and similar organizations delivering multi-component interventions. The significant association between AC-process component adoption and reduction in physical and mental complaints suggests that this component represents a core mechanism within the intervention. Strengthening reinforcement of this component, both during and after the intervention, may enhance overall impact. Providing structured follow-up sessions, reminders or digital prompts could support sustained application in daily life. Additionally, the observed association between AT component adoption and complaints indicates that language-based cognitive reframing may play a more central role in physiological recovery than initially assumed. Integrating this component more explicitly into practice exercises and reflection activities may therefore be beneficial.

At the same time, the absence of significant effects for stress and well-being indicates that practitioners should not assume that increased behavioural adoption automatically translates into improvements across all outcome domains. Enhancing well-being may require longer-term support, deeper internalization processes or complementary individual changes. Monitoring adoption at the component level can serve as a diagnostic tool to identify which

elements are actively integrated and where additional support may be necessary. This enables more targeted optimization and refinement of the intervention.

5.4 Limitations and directions for future research

Several limitations of this study should be acknowledged. The sample size was relatively modest, which may have limited statistical power, particularly for detecting interaction effects. Furthermore, adoption was measured through self-reported frequency and extent of use, which does not capture the quality or correctness of application. Participants may report frequent use without effectively activating intended mechanisms of change. In addition to this, the study relied on secondary data collected for monitoring purposes, which constrained the operationalization of constructs. The absence of a control group limits causal inference. Additionally, entering all components simultaneously into regression models may have reduced the likelihood of detecting unique effects due to shared variance. Another limitation of this study is that although the individual components were analysed while statistically controlling for other components, the potential interrelationships and combined effects among the individual intervention components were not explicitly examined.

Future research could apply configurational methods such as Qualitative Comparative Analyses (QCA), which do not assume additive effects but instead examine combinations of conditions leading to outcomes. Given the multi-component nature of the intervention, such approaches may better capture complex patterns of adoption and identify how different constellations of intervention components jointly contribute to the outcomes. Future research could also examine adoption not only in terms of extent, but also in terms of quality, contextual timing and internalization. Larger samples would enhance statistical power for testing moderation effects. Multi-wave longitudinal designs could clarify whether well-being effects emerge over longer time horizons. Further investigation of mediations, such as improvements in emotional regulation or cognitive flexibility, could help explain the pathways through which specific components influence outcomes. Qualitative or mixed-method approaches may provide deeper insight into how participants experience and interpret intervention components in daily life. Future research could also examine whether sustained adoption of intervention components should be considered an outcome in its own right, rather than merely a predictor of improvements in stress level, physical and mental complaints, and well-being.

5.5 Conclusion

This study examined whether the extent to which participants adopt Company X's intervention component predicts intervention effectiveness. The findings demonstrate that

adoption matters, but selectively. Stronger adoption of the AC-process and AT components was associated with reductions in physical and mental complaints. However, adoption did not significantly predict changes in stress level or well-being and coping capacity did not moderate these relationships.

These results contribute to a more nuanced understanding of intervention effectiveness in real-world settings. They show that complex interventions should be evaluated as systems of interacting components whose behavioural enactment influences outcomes in differentiated ways. Effectiveness depends not merely on exposure or participation, but on how specific elements are integrated into daily life and how these elements connect to distinct mechanisms of change. By empirically positioning adoption as a central explanatory construct, this study strengthens the theoretical bridge between implementation science and effectiveness research and offers practical guidance for optimizing multi-component health interventions.

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Appendix A: Questionnaire

Operationalisation variables			
Independent variables	**Question number**	**Question**	**Answer categories**
Adoption AC-process components	322	*Naar inschatting, hoeveel keer heb je het 'AC-Proces' gelopen (vanaf de laatste keer dat je deze vragenlijst hebt ingevuld)?*	0-250
Adoption VBH components	324	*Naar inschatting, hoeveel keer heb je de 'Verbonden Brein Houding' toegepast (vanaf de laatste keer dat je deze vragenlijst hebt ingevuld)?*	0-250
Adoption KR components	325	*Naar inschatting, hoeveel keer heb je de 'Korte route' toegepast (*vanaf de laatste keer dat je deze vragenlijst hebt ingevuld)?	0-250
Adoption JS components	326	*Naar inschatting, hoeveel keer heb je de 'Juiste staat' toegepast (*vanaf de laatste keer dat je deze vragenlijst hebt ingevuld)?	0-250
Adoption OO components	327	*Naar inschatting, in hoeverre pas je 'Overtuigingen omzetten' toe als je een belemmerende overtuiging opmerkt?*	0-100
Adoption PS components	328	*Naar inschatting, in hoeverre pas je 'Positief selecteren' toe als je geconfronteerd raakt met een situatie of persoon die jou stress kan geven?*	0–100
Adoption AT components	329	*Naar inschatting, in hoeverre heb je 'Actieve taal' geïntegreerd in jouw dagelijkse communicatie?*	0–100

Operationalisation variables			
Dependent variables	**Question number**	**Question**	**Answer categories**
Stress level	78	*Ik vond het moeilijk mezelf te kalmeren*	Helemaal niet van toepassing Een beetje van toepassing Behoorlijk van toepassing Zeer zeker van toepassing
	79	*Ik had de neiging om overdreven te reageren op situaties*	
	80	*Ik was erg opgefokt*	
	81	*Ik merkte dat ik erg onrustig was*	
	82	*Ik vond het moeilijk me te ontspannen*	
	83	*Ik had volstrekt geen geduld met dingen die me hinderden bij iets dat ik wilde doen*	
	84	*Ik merkte dat ik nogal licht geraakt was*	
Physical and mental complaints	42	*Moeheid en/of vermoeidheid*	0 Geen enkele dag – 50 In de helft van de dagen – 100 Elke dag
	43	*Hoofdpijn en/of duizeligheid*	
	44	*Concentratieproblemen, vermoeide ogen, vergeetachtigheid en/of verwardheid (niet goed kunnen nadenken)*	
	45	*Huidproblemen, huiduitslag en/of jeuk (waaronder allergie)*	
	46	*Infectie van virus of bacterie en de nasleep daarvan (waaronder Long-COVID)*	
	47	*Oorsuizen; zoem of piep in de oren*	
	48	*Pijn in schouders, nek en/of onderrug*	
	49	*Pijn in bindweefsel, spieren en/of gewrichten*	
	50	*Zure oprispingen/brandend maagzuur*	
	51	*Maagklachten, misselijkheid en/of maagkrampen (niet menstrueel)*	
	52	*Darmproblemen en/of stoelgangproblemen (o.a. prikkelbare darmen, opgeblazen gevoel, verstopte darmen, diarree)*	

	53	*Kortademigheid, pijn op de borst of hartkloppingen/versnelde adem (zonder jezelf in te spannen)*	
Well-being	163	*Binnen de mogelijkheden die ik heb, leid ik het leven dat ik wil leiden*	Helemaal mee oneens Tamelijk mee oneens Beetje mee oneens Neutraal Beetje mee eens Tamelijk mee eens Helemaal mee eens
	164	*Iets of iemand weerhoudt me ervan om te doen wat ik wil doen in het leven (R)*	
	165	*Het leven biedt mij nauwelijks kansen (R)*	
	166	*Ik zie veel toekomstperspectief in mijn leven*	
	167	*In de meeste gevallen is mijn leven bijna ideaal*	
	168	*Mijn levensomstandigheden zijn uitstekend*	
	169	*Ik ben tevreden met het leven*	
	170	*Tot nu toe heb ik de belangrijkste dingen in mijn leven bereikt*	
	171	*Als ik mijn leven opnieuw kon beginnen, dan zou ik bijna niets veranderen*	

Operationalisation variables

Moderator	**Question number**	**Question**	**Answer categories**
Coping capacity	235	Als ik iets moet oplossen wat ik niet leuk vind dan: Stel ik dat uit – Ga ik daar gelijk mee aan de slag	0-100
	236	Als ik een ingewikkeld probleem heb dan: zoek ik het alleen uit, ook al kan ik hulp gebruiken - vraag ik tijdig om hulp of advies	0-100
	237	Als ik een schaamtevol probleem heb dan: hou ik dat zoveel mogelijk voor mijzelf – ben ik daar open en eerlijk over	0-100

238	Als ik een situatie, die voor mij belangrijk is, moeilijk kan veranderen dan: leg ik me daarbij neer en accepteer ik dat – strijd ik door, ook al kost het mij veel	0-100
239	Als ik problemen heb dan: denk ik aan alle ellende die daarmee te maken heeft – denk ik aan iets leuks dat mij opvrolijkt	0-100
240	Als ik in een benarde en onzekere situatie zit dan: zie ik vooral de negatieve kanten daarvan – probeer ik daar iets positiefs in te zien	0-100
241	Als een familielid of vriend mij kwetst en pijn heeft gedaan dan: Kan ik hem/haar moeilijk vergeven – Kan ik hem/haar makkelijk vergeven	0-100
242	Als een familielid of een vriend mij slecht behandelt dan: behandel ik hem/haar wel goed – behandel ik hem/haar op dezelfde manier	0-100
243	Als een familielid of een vriend mij kwetst en pijn heeft gedaan dan: sluit ik mijzelf voor hem/haar af – blijft hij/zij mijn oprechte aandacht krijgen	0-100
244	Als ik in een heftige discussie zit met een familielid of vriend en we dreigen ruzie te krijgen dan: geef ik de ander gelijk – blijf ik toch achter mijn mening staan	0-100
245	Als ik in een pittige discussie zit met een familielid of vriend en hij/zij heeft ongelijk dan: bots ik en krijgen we ruzie – trek ik mij uit de strijd terug om de balans te bewaren	0-100

Operationalisation variables			
Control variables/ demographics	**Question number**	**Question**	**Answer categories**
Gender	308	Wat is je geslacht of waar identificeer jij je het meest?	Man; vrouw; non-binair; transgender; cisgender
Age	309	In welke leeftijdsklasse zit je?	11–15; 16–20; 21–25; 26–30; 31–40; 41–45; 46–50; 51–55; 56–60; 61–65; 66–70; 71–75; 76–80; 81–85; 86–90; 90+
Educational level	311	Wat is je hoogst afgeronde opleidingsniveau of als je momenteel studeert: op welk niveau volg je de opleiding	Geen; basisschool; VMBO; HAVO; VWO/Gymnasium; MBO; HBO; Universiteit

Appendix B: Factor Analyses

Factor loadings for the stress scale (final solution)

Item	Factor 1
Q78	.793
Q80	.697
Q82	.656
Q83	.715

Note. Extraction method: principal component analyses. Three items were excluded: Q79, Q81, Q84

Factor loadings for the physical and mental complaints scale (final solution)

Item	Factor 1
Q42	.554
Q43	.562
Q44	.618
Q46	.419
Q47	.463
Q48	.537
Q49	.435
Q50	.478
Q51	.513
Q52	.373
Q53	.426

Note. Extraction method: principal component analyses One item was excluded: Q45.

Factor loadings for the well-being scale (final solution)

Item	Factor 1
Q163	.835
Q164	.278
Q166	.713
Q167	.888
Q168	.712
Q169	.714
Q171	.491

Note. Extraction method: principal component analyses. Two items were excluded: Q165 and Q170

Factor loadings for the coping capacity scale (final solution)

Item	Factor 1
Q235	.396
Q237	.449
Q239	.670
Q241	.468

Q242	.621

Appendix C: Reliability

Reliability

Scale	Items (Final)	Cronbach's **α**	N of items
Stress level	Q79, Q80, Q82, Q83	.681	4
Physical and mental complaints	Q42-44, Q46-53	.762	11
Well-being	Q163, Q164, Q166-Q169, Q171	.830	7
Coping capacity	Q235, Q237, Q239, Q241, Q242	.607	5

Appendix D: Regression assumptions

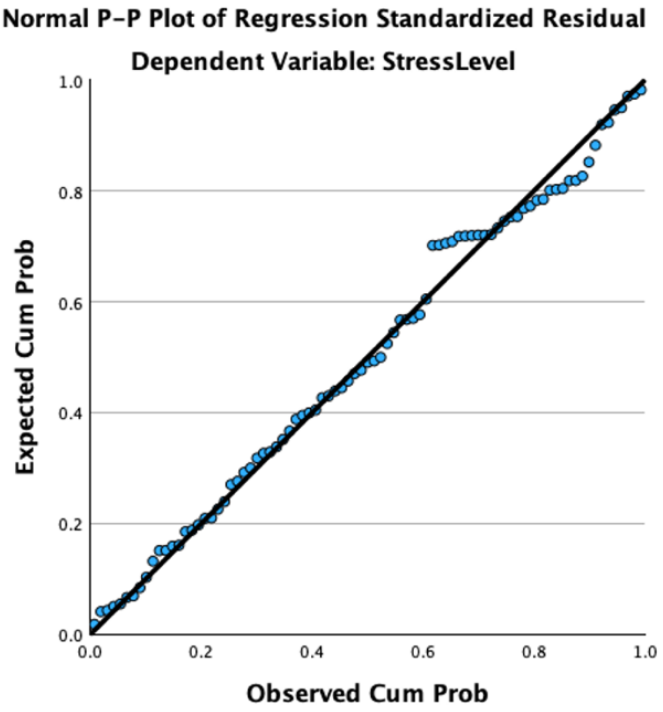
Tolerance values & VIF

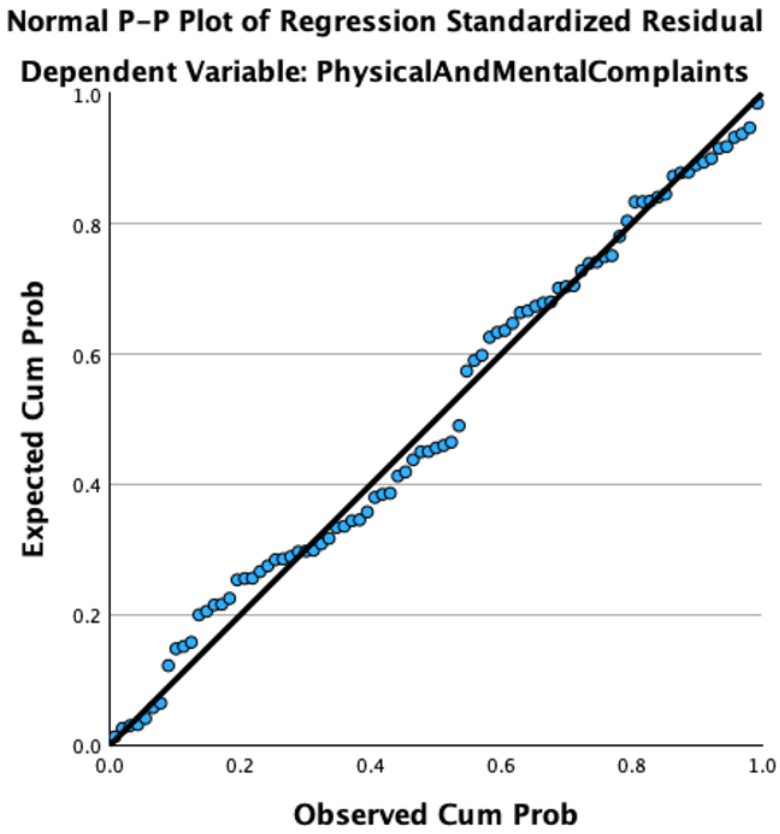
Predictor	Tolerance	VIF
AC-process	.543	1.84
Coping capacity	.881	1.14
AC × Coping	.839	1.19
VBH	.586	1.71
KR	.487	2.05
JS	.348	2.88
OO	.469	2.13
PS	.371	2.70
AT	.685	1.46
Age	.834	1.20
Educational level	.837	1.20
Gender	.815	1.23

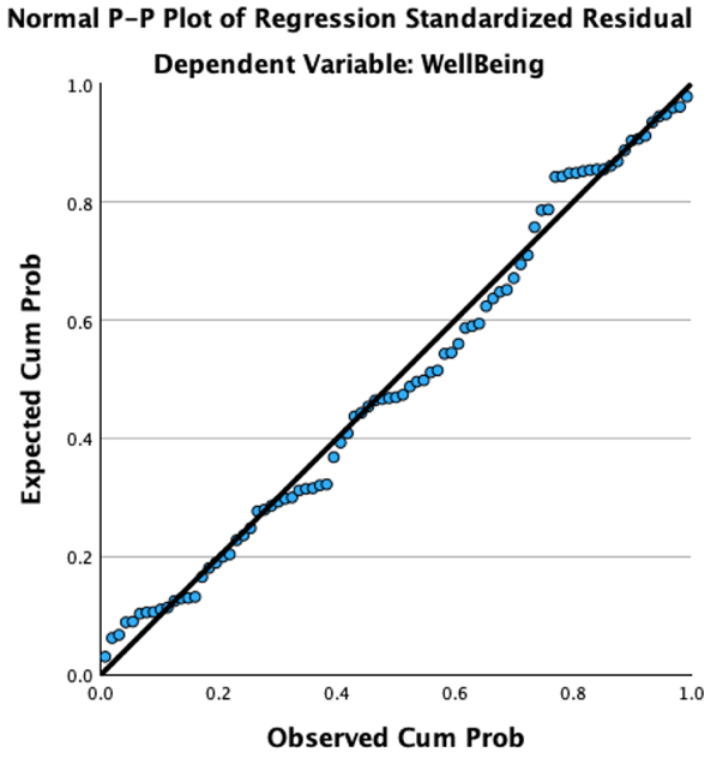
Note. Values were comparable across outcome variables (stress level, physical and mental complaints and well-being

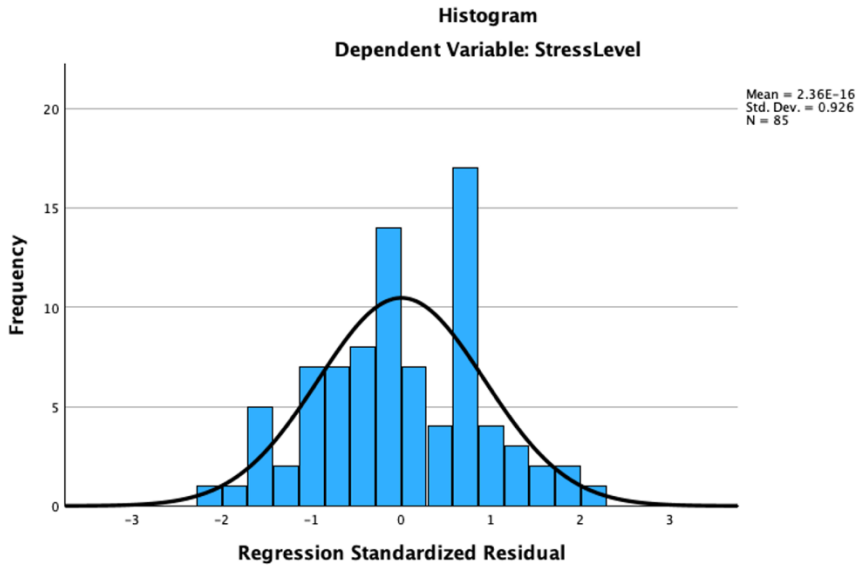
Durbin-Watson statistics

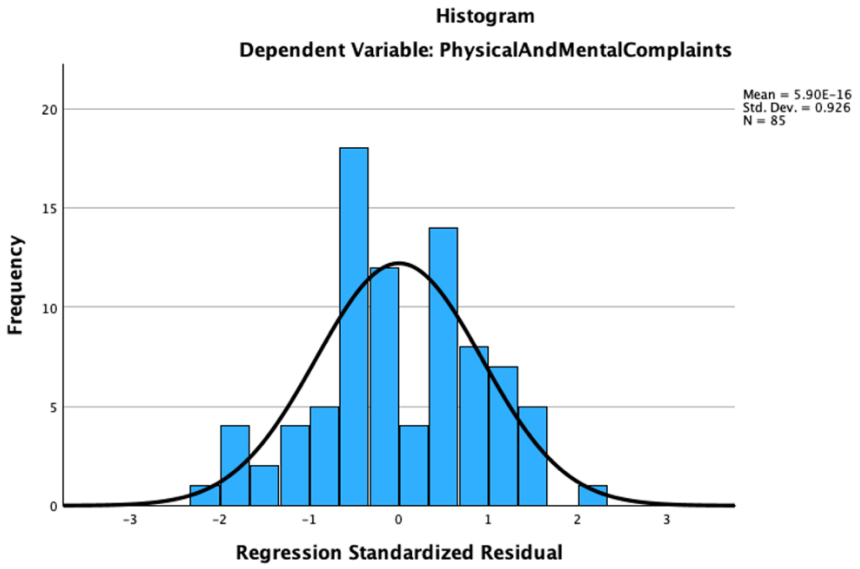
Model	Dependent Variable	Durbin–Watson
1	Stress Level	1.900
2	Physical & Mental Complaints	1.523
3	Well-Being	1.947




Normal P-P Plot of Regression Standardized Residual
Dependent Variable: PhysicalAndMentalComplaints
Expected Cum Prob
Observed Cum Prob
0.0
0.2
0.4
0.6
0.8
1.0


Normal P-P Plot of Regression Standardized Residual
Dependent Variable: WellBeing
Expected Cum Prob
Observed Cum Prob
0.0
0.2
0.4
0.6
0.8
1.0


Histogram
Dependent Variable: StressLevel
Mean = 2.36E-16
Std. Dev. = 0.926
N = 85
Frequency
Regression Standardized Residual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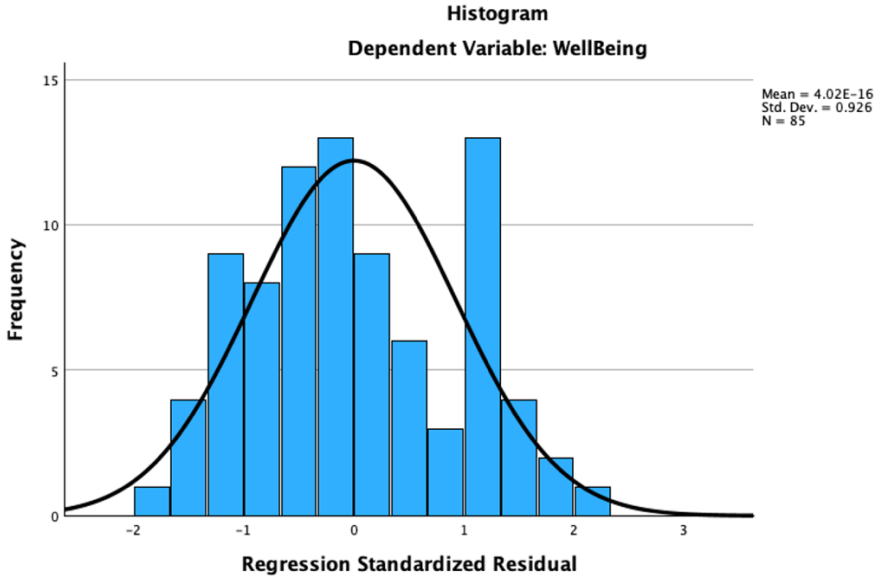
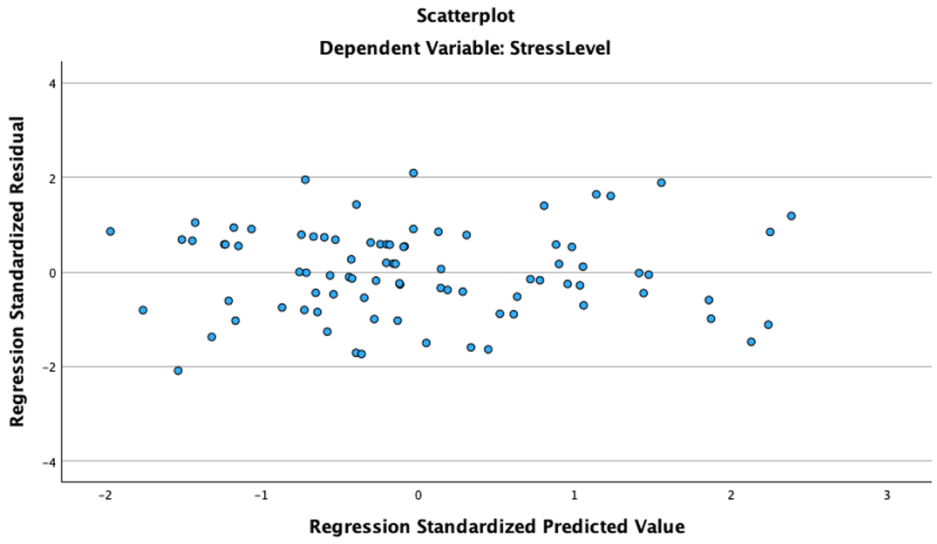
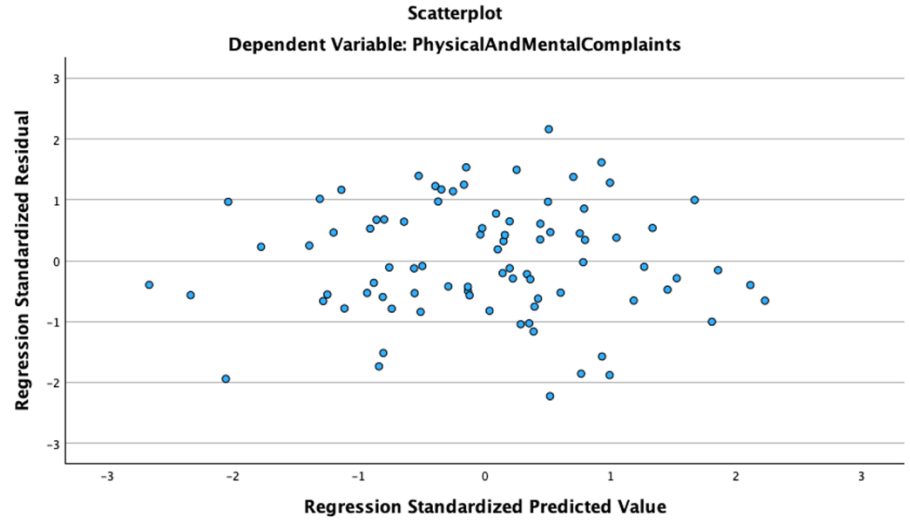
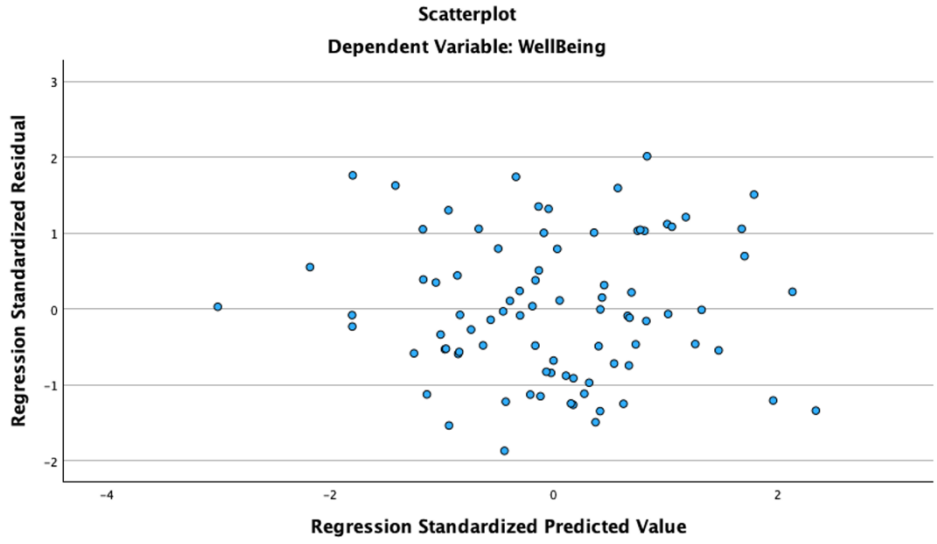
Dependent Variable: PhysicalAndMentalComplaints
Mean = 5.90E-16
Std. Dev. = 0.926
N = 85
Frequency
Regression Standardized Residual


Histogram
Dependent Variable: WellBeing
Mean = 4.02E-16
Std. Dev. = 0.926
N = 85
Frequency
Regression Standardized Residual


Scatterplot
Dependent Variable: StressLevel
Regression Standardized Residual
Regression Standardized Predicted Value


Scatterplot
Dependent Variable: PhysicalAndMentalComplaints
Regression Standardized Residual
Regression Standardized Predicted Value


Scatterplot
Dependent Variable: WellBeing
Regression Standardized Residual
Regression Standardized Predicted Value