Technology, Knowledge and Learning

Insights from Digitalized Innovation Environments: Fabrication Laboratories as Catalysts for Digital Competency Enhancement

--Manuscript Draft--

Manuscript Number:	TKNL-D-24-00699R2
Full Title:	Insights from Digitalized Innovation Environments: Fabrication Laboratories as Catalysts for Digital Competency Enhancement
Article Type:	Regular Submission
Section/Category:	Original research
Keywords:	Digitalized Innovation Environments; FabLab; Digital competencies; Educational Interventions; Technology-Enhanced Learning
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Funding Information:	
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Response to Reviewers:	As requested by reviewer 4, I have made a minimal adjustment to the arrangement of figure 1 on page 9.
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Insights from Digitalized Innovation Environments: Fabrication Laboratories as Catalysts for Digital Competency Enhancement

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1. INTRODUCTION

The digital transformation is an unstoppable process that has now permeated all areas of our lives and is calling existing structures and processes into question (Vial, 2019). This phenomenon is the subject of intense debate both in academic research (Bharadwaj et al., 2013; Piccinini et al., 2015) and in practice (Fitzgerald et al., 2014; Westerman et al., 2011). It concerns both the private and the corporate perspective (Hartmann et al., 2016). As the digital transformation affects all areas of life, it is also viewed from different perspectives in various research disciplines.

In this context, a number of new phenomena have emerged in recent years that take into account the individual aspects of digital transformation. In particular, global networking, the accessibility of new types of technologies and improved user-friendliness are also enabling innovative further developments for start-ups and private individuals (Iansiti & Lakhani, 2014; Nambisan et al., 2017). Innovation processes are becoming increasingly open and are leading to the integration of various actors into the process (Chesbrough, 2003; Hippel, 2007; Tidd & Bessant, 2016). At the same time, digital tools are playing an increasingly important role. For example, digital fabrication technologies such as 3D printing harbor enormous potential in product development, while AI assistants are already playing a central role in software development (Ozkaya, 2023; Wolf et al., 2014).

Digitalized innovation environments (DIE) such as fabrication laboratories (FabLabs), makerspaces and innovation hubs, which provide a variety of digital technologies in a physical space and invite a diverse user base to experiment, are also part of this development (Capdevila, 2013). These environments have emerged in both private and academic environments, but are also increasingly being recognized in the commercial sector due to their potential (Bergner, 2017; Konopek et al., 2018; Ruberto, 2015). Initial studies have already identified a large number of potentials and provided valuable insights into the targeted design of such innovation spaces (Hellwig et al., 2021c).

Digital competencies form the basis for all of the aforementioned developments that arise in the context of digital transformation (Hellwig et al., 2021a). These play a central role in participating in the changes resulting from the digital transformation. DIEs are already being used to support the competency acquisition of key digital competences (García-Ruiz & Lena-Acebo, 2022; Zakoth & Mauroner, 2020). However, the actual impact of a DIE intervention has not yet been adequately quantified. In this paper, we attempt to take a closer look at this bind spot and validate the influence of DIE on participants' competency acquisition as part of an extensive series of interventions. At the same time, the aim is to develop a method to measure a standardized set of competencies.

The aim is to create a tool for comparing different interventions within a DIE on the basis of the competences addressed (competence profiles). The following research questions therefore arise for the paper:

- *Which contribution can DIEs make to competency acquisition?*
- *Which digital competencies are particularly addressed in a specific DIE intervention?*
- *Which demographic groups benefit most from DIE interventions?*
- *Does the methodology used make it possible to identify competency profiles of DIE interventions?*

In order to answer these questions appropriately and to gain a comprehensive insight into the effects on competency acquisition within DIEs, a specific DIE intervention needs to be conceptualized that addresses as many characteristics of a DIE as possible. Subsequently, pre and post-tests will be used to analyze the changes in competencies as a result of the participants' taking part in the DIE activity. A quantitative evaluation will also provide insights into the strength of the effect and enable a competence profile to be derived. In this way, a valuable contribution to the understanding of the still relatively new DIE phenomenon will be made and the theoretically derived potentials will be verified (Nambisan et al., 2017). Through its comprehensive design, this study not only seeks to quantify the impact of DIEs on competency development but also to contribute to the broader discourse on the role of such environments in facilitating continuous, lifelong learning in the digital age.

2. DIGITALIZED INNOVATION ENVIRONMENTS

Within the sphere of innovation, Digitized Innovation Environments emerge as central arenas for competency development, traversing conventional boundaries among private, academic, and, to a lesser extent, commercial sector (Böhm et al., 2015; Duh & Kos, 2017; Hellwig et al., 2021c; Hellwig et al., 2022; Osunyomi et al., 2016; Zakoth & Mauroner, 2020). These environments, characterized by their hybrid nature, combine digital technologies with physical spaces to facilitate collaborative and interdisciplinary innovations (Boutillier et al., 2020; Suire, 2016). In contrast to antecedent models like coworking spaces and Living Labs, which predominantly emphasized collaborative work and user-driven innovation (Almirall et al., 2012; Capdevila, 2014), DIEs encompass a broader array of digital tools - such as 3D printers, CNC milling machines, and comprehensive electronics labs - to democratize the innovation process. This democratization affords individuals, irrespective of their prior expertise in craftsmanship, the opportunity to engage in rapid prototyping of functional models (Gershenfeld, 2012). The accessibility of advanced digital tools within DIEs has revolutionized the acquisition and application of competencies, enabling users to navigate the innovation process more adeptly and contribute meaningfully (Hellwig et al., 2021c). Competence acquisition does not take place through systematic fictitious tasks, as is usually the case, but accompanies an innovation process that is intrinsically motivated. The emergence of diverse DIE typologies - FabLabs, Makerspaces, InnovationLabs, Hackerspaces, and Cocreation Laboratories - demonstrates the manifold approaches to fostering innovation across different contexts. However, the plethora of terms and concepts underscores the challenge of categorizing these environments solely based on nomenclature or the technologies housed within them (Aryan et al., 2020; Capdevila, 2017) .

The conceptualization of DIEs, as articulated in recent scholarly discourse (Herron & Kaneshiro, 2017; Hynes & Hynes, 2018; Wong & Partridge, 2016), endeavors to unify these multifaceted innovation spaces under a cohesive framework. DIEs are delineated as physical spaces that integrate traditional craftsmanship with cutting-edge digital technologies to support collaborative, interdisciplinary innovations, and knowledge dissemination. This description accentuates the role of DIEs not merely as repositories of technology, but as dynamic ecosystems wherein individuals cultivate and refine a diverse spectrum of competencies (Hellwig et al., 2021a). We use the following definition of "Digitalized Innovation Environments"(Hellwig et al., 2021c):

Digitalized Innovation Environments are physical spaces that provide both traditional and digital tools and state of the art technologies to support collaborative and interdisciplinary innovation and knowledge transfer.

While there have been endeavors to incorporate DIEs into corporate innovation strategies, their central potential in facilitating competency development across diverse domains remains largely untapped. The focus on DIEs within corporate milieus has predominantly centered on bolstering research and development endeavors (Lo, 2014; Ruberto, 2015). Nonetheless, the broader application of DIEs for competency acquisition warrants further exploration, particularly with regard to the specific competencies that can be targeted (González-Nieto et al., 2020). The potential of DIEs to make a valuable contribution to the acquisition of competencies, especially digital competencies, has already been identified (Hellwig et al., 2021c). The limited empirical inquiry into DIEs and their influence on competency development indicates an emergent domain ripe for investigation. Consequently, this endeavor aims to expose the mechanisms through which DIEs foster competency acquisition, with particular attention to the formats conducive to this objective. Such inquiry stands to enrich our comprehension of DIEs' role within the innovation ecosystem and furnish invaluable insights for educators, policymakers, and innovation stakeholders alike.

3. METHOD

Having previously identified theoretical potentials in prior studies, the next step is to empirically investigate them. To accomplish this, a selected setting was utilized, which allows for an exploratory investigation while also testing an instrumentation for conducting further research.

3.1 Research Design

The study's methodology is carefully designed to explore the impact of participation in FabLab events on the acquisition of digital competencies within one of Europe’s largest and best equipped DIEs in Germany. This FabLab, selected for its adherence to a global FabLab charter, provides a consistent and replicable model for examining the efficacy of DIEs in fostering digital literacy and competency development, ensuring that findings have broader applicability across similar innovation spaces (*The Fab Charter*, 2015; Gershenfeld, 2012). The DIE in which the intervention took place is operated as a laboratory by a local university and spans approximately 600 square meters. It houses a variety of digital fabrication technologies along with dedicated workspaces and meeting areas designed to facilitate exchange and collaboration. In addition to the devices used in the mini-workshops, the lab also features industry-grade equipment. However, these advanced systems were not utilized due to their complexity in operation. Thus, the present DIE meets the criteria outlined above for a DIE, thereby enabling the transfer of findings to other similar facilities.

The study's competency assessment is anchored in the business competency framework within digital transformation, which delineates a comprehensive set of digital competencies relevant to the evolving demands of the digital economy (Hellwig et al., 2021a). By adapting this framework to the context of the FabLab event, the research narrows its focus to 14 competencies deemed most likely to be influenced by the intervention. This selection process is informed by prior empirical studies demonstrating the framework's relevance and adaptability to similar digital innovation settings, ensuring that the competencies under investigation align with both the educational objectives of DIEs and the practical requirements of digital innovation (Hellwig et al., 2021b). The following competencies in five categories were specifically targeted by the intervention and accordingly assessed in the questionnaires:

Learning - Category

a. Willingnes to Learn– Self-motivation to acquire new information and knowledge.
b. Digital Learning – Ability to utilize digital technologies and communication tools for knowledge acquisition.
c. Digital Coaching – Ability to disseminate knowledge using digital technologies and communication tools.
d. Digital Information Seeking – Ability to access information and data sources in the digital environment.

Understanding - Category

e. Understanding Digital Transformation – Knowledge of the impact of digital transformation on businesses.

Analyzing - Category

f. Critical Thinking – Ability to critically evaluate digital information, particularly.
g. Media Analysis – Ability to analyze and evaluate digital media.

Creating - Category

h. Digital Problem Solving – Ability to select and utilize digital technologies according to requirements.
i. Programming – Ability to create or adapt computer programs.
j. Digital Innovating – Ability to develop ideas and opportunities based on digital technologies.
k. Content Creation – Ability to create, edit, and integrate digital content.

Communicating - Category

l. Digital Interaction – Ability to use presentation technologies and devices effectively.
m. Digital Collaboration & Cooperation – Ability to use digital tools for collaborative processes.
n. Digital Presenting– Ability to present content using digital technologies.

The participants assessed these competencies based on the provided description texts for their self-assessment. The competencies mentioned are based on the Business Competency Framework within Digital Transformation by Lukas Hellwig(2021a), which includes a total of 32 competencies across six categories. However, only 14 of the 32 identified competencies were used in the present study to maintain questionnaire manageability for the intended audience and achieve higher data quality. The competencies included were preselected based on theoretical foundations. Competencies from the 'Managing' category were excluded as they are not addressed by the intervention concept and are not relevant to the target audience. The focus was solely on competencies falling under the categories of 'Learning,' 'Creating,' and 'Communicating'. Supplementary competencies from the 'Understanding' and 'Analyzing' categories should also cover additional basic skills on which many other competencies are based. Each competency was evaluated based on its alignment with the intervention's learning objective and relevance to the target audience. This led to the selection of 14 competencies. A mapping of the addressed competencies to the intervention components can be found in Section 3.2. While some competencies, such as "i. Programming", are addressed only by specific mini-workshops, broader or more fundamental competencies, such as "a. Willingness to Learn" or "e. Understanding Digital Transformation", are integrated across all components. For example, 'Security Awareness' was excluded as it was not addressed in any section of the intervention. Therefore, only competencies that were assumed to be addressed within the intervention framework and potentially influenced were queried.

Data were collected through analog questionnaires, distributed to participants at the event's commencement and then again following the intervention. This dual-point data collection strategy is critical for attributing any observed competency developments directly to the FabLab activities, bolstering the study's claim regarding the efficacy of DIEs in competency enhancement. Such a methodological choice underscores the importance of self-assessment in capturing perceived growth in digital competencies, aligning with research that highlights the value of self-reported measures in educational settings (Bandura, 2012).

The participants were asked to self-assess their competencies on a five-point scale based on Dreyfus-Modell (Dreyfus & Dreyfus, 1980). For each of the five levels, explanatory texts were provided as follows:

• Novice: You are only familiar with some general and theoretical principles. You have no practical experience in application.
• Beginner: You have basic knowledge and have already applied it.
• Competent: You can consciously and purposefully access your skills and apply them effectively.
• Proficient: You apply your skills spontaneously and automatically, without needing to derive them theoretically.
• Expert: You have internalized your competencies to the extent that you can apply them intuitively and situationally without theoretical deliberation.

These explanations, along with the competencies and their associated descriptions, were provided to the participants in the local language.

In addition to competency assessments, the collection of participant metadata - age, highest educational attainment, and prior DIE experience - enriches the dataset, enabling a multifaceted analysis of how different demographic factors may influence or interact with the competency development process. This aspect of the study design acknowledges the diverse backgrounds of DIE participants and seeks to understand how such diversity might affect the acquisition and application of digital competencies (Ruberto, 2015; Zakoth & Mauroner, 2020).

For easier access, the questionnaire was designed in a color-coded way to differentiate between the areas to be completed before and after the intervention. At the same time, open fields were provided for the date and any abbreviation of the participants in order to be able to identify the questionnaires. Before the study began, the questionnaire was tested by a total of 9 people. In particular, feedback was obtained on comprehensibility, correct translation and effort. The evaluation of the pre-test did not reveal any need for further changes to the questionnaire.

The quantitative research strategy, chosen for its robustness in measuring changes in competency levels, employs a one-group pretest-posttest design. This design is crucial for isolating the effects of the intervention on participants' digital competencies and enables a clear delineation of learning outcomes attributable to the FabLab experience. Although the absence of a control group presents certain limitations, the chosen design is appropriate given the practical constraints associated with working with a limited participant pool.

A one-group pretest-posttest design is particularly suitable for educational contexts where external factors influencing learning outcomes can be reasonably controlled or monitored (Creswell, 2014; McMillan, 2012; Campbell & Stanley, 2015; Cook & Campbell, 1979). As outlined by Dimitrov and Rumrill (2003), this design offers a practical and effective means of assessing measurable changes in participants' knowledge, skills, or attitudes following a targeted intervention. Despite its sensitivity to threats to internal validity, such as maturation, testing effects, and external influences, these risks can be mitigated through careful study design and contextual awareness (Shadish et al., 2002).

In this study, baseline data were collected prior to the intervention to establish an initial competency profile and to ensure that subsequent changes could be more confidently attributed to the FabLab experience. By conducting a posttest immediately after the intervention, the design minimizes the influence of confounding variables, particularly in a controlled educational environment (Dimitrov & Rumrill, 2003). Although a control group would have strengthened causal inference, the exclusive availability of a single participant group necessitated the use of a one-group design. As Vickers and Altman (2001) emphasize, valid insights can still be derived from such designs by applying appropriate statistical methods and ensuring that observed changes exceed what would typically be expected from natural progression or learning effects.

To enhance the reliability of the findings, strategies were implemented in this study to avoid potential biases associated with the design. A clear operationalization of items was undertaken to ensure consistent data collection. Furthermore, established assessment tools were selected to improve measurement validity.

By adopting a one-group pretest-posttest design and integrating best practices to mitigate design limitations, this study ensures that the reported results provide meaningful insights into the development of digital competencies facilitated by the FabLab intervention.

The study was conducted in close collaboration with various service providers tasked by the government to assist individuals in their training search through various (mandatory) measures. Consequently, the age and educational levels of most participants were relatively low. The majority of participants were under the age of 20; however, there were also participants aged between 50 and 60. The overall low average educational level is reflected in the distribution of qualifications. While most participants had no formal degree, there was also one participant with a doctoral degree. Due to the very specific group of test subjects with a limited number, a methodology based on a comparison group could not be implemented.

3.2 Intervention Description

In this initial investigation into the effects of a FabLab intervention on competency development, emphasis was placed on enrolling a comprehensive cohort of participants. Given the necessity for the intervention to remain practical and tailored to the needs of the expected target demographic, it was constrained to cover only the fundamental aspects. Concurrently, it was imperative to maintain the distinctive nature of conventional digital education initiatives events to fully leverage the hypothesized benefits. The objective of the FabLab experience day was to acquaint attendees with the capabilities of the FabLab, providing them with the opportunity to engage with these facilities within a span of four hours. The event aimed to impart basic digital skills, foster awareness of digital transformation, and introduce all pertinent technologies in an experiential manner. Prototypes and examples were employed to stimulate consideration of the potentials offered by a FabLab. Supplementary background information was provided, enabling participants to conduct preliminary feasibility evaluations.

The number of participants was limited to twenty in order to allow each participant to have individual access to the various technologies. Starting with an introductory theoretical session on the FabLab concept, technologies were explored through practical experiences. Accompanying explanations regarding the technical framework offered a basic understanding necessary for evaluating the technologies. Visualization aids were utilized to bridge theory with potential inquiries. In a culminating discussion, the elements demonstrated were critically evaluated in the context of the specific participant group.

The core of the event was the interactive hands-on segment, wherein the total group was divided into two smaller groups, rotating through six stations, ensuring individual exposure to all technologies. This arrangement, facilitated by FabLab staff, allowed for intimate testing environments. Each station was allocated thirty minutes, accompanied by tailored mini-learning scenarios. The stations featured in all interventions included:

1. **3D Printing**: Participants were introduced to a user-friendly CAD (Computer-Aided Design) software and designed personalized keychains. During this process, they were guided through the basic shapes but were also given time for independent research and inspiration. Participants were required to independently assess the suggested information sources, identify relevant information, and extract it accordingly. Subsequently, the fundamentals of 3D printing were explained, followed by a live demonstration in which the designed keychains were printed. While the participants were introduced to key principles during this step, they were also given flexibility to make individual adjustments, such as selecting the scale and print quality. (addressed competencies: a, b, d, e, g, h, I, j, k)
2. **Laser Cutting**: The instruction covered the basics of vector-based image editing and laser cutting technology, which enabled participants to create personalized engravings or shapes. In addition to the fundamentals of laser cutting technology, an open-source software was introduced, allowing participants to create their own designs independently. To support this, participants were encouraged to seek inspiration and utilize available templates. In most cases, these templates required adjustments, which were moderated to ensure successful implementation before participants finalized their own designs.. (a, b, c, d, e, h, j, k)
3. **3D Scanning**: Using portable 3D scanners, participants had the opportunity to create 3D scans of each other while being introduced to the underlying technology and guided through the post-processing steps. This hands-on experience allowed participants to explore both the challenges and potential of 3D scanning technology firsthand. Following an initial demonstration, participants were encouraged to train each other in using the 3D scanner and present their results. During this process, critical aspects of 3D scanning were also discussed, along with practical applications in industrial settings. (a, b, c, e, f, g, h, j, k, l, m, n)
4. **Vinyl Cutting**: Before the explanations on data preparation, participants were introduced to automated cutting machines, which they used to produce their own custom stickers. They were encouraged to familiarize themselves with the materials provided and create their own designs using the available software. To implement their designs, various solution strategies were demonstrated, from which participants had to independently select the most effective approach. During the data creation process, participants supported one another and collaboratively developed new solution strategies. (a, b, e, h, j, k)
5. **Virtual Reality (VR)**: In an introductory session on VR design software, participants were introduced to the fundamentals of virtual reality technology. The session explored both the challenges and potential applications of VR, addressing its relevance in both personal and professional contexts. Following this, participants had the opportunity to gain hands-on experience by creating their own 3D models in the virtual environment. Throughout the process, participants supported one another by explaining how to use the equipment and presenting their results to the group. (a, b, d, e, f, g, h, j, k, l, m, n)
6. **Programming**: The participants assembled a simple circuit using basic kits and programmed it with an introductory programming language by simulating and modifying a traffic light system. During this process, the individual components of the circuit were explained, along with the fundamental syntax of the programming language. Participants followed the circuit-building instructions and were encouraged to customize their circuits and demonstrate their results. Additionally, they utilized public

databases to research further functions. More experienced participants supported others in implementing their ideas, fostering a collaborative learning environment. (a, b, c, d, e, f, g, h, I, j, k)

The six mini workshops collectively represent a cross-section of the most common technologies found in a DIE and illustrate various perspectives on product development through digital fabrication. The process covers the full spectrum from data creation (3D scanning, virtual reality) to manufacturing (laser cutting, 3D printing, and vinyl cutting) and finally to commissioning (programming). This approach was designed to demonstrate, on a small scale, the technological processes as they occur in industry while imparting fundamental core competencies in handling these technologies (Hellwig et al., 2021a). Particularly in times of increasing automation, these digital skills are considered crucial for the future labor market. The aim was to provide the specific target group of job-seeking participants with new perspectives and to lay the foundation for further specialized qualifications in relevant fields.

Data collection framed the event, commencing prior to the FabLab concept presentation and concluding following the discussion segment. This structured approach facilitated a comprehensive evaluation of the intervention's impact on participants' competency development, aligning with theoretical constructs of experiential learning and digital literacy enhancement.

To streamline data collection during the intervention, questionnaires were filled out simultaneously by all up to 20 participants. Due to a lack of sufficient technical equipment to directly capture the questionnaires digitally, conventional paper questionnaires were used. These questionnaires had to be digitized afterward to analyze the large amounts of data using SPSS. To do this, the ordinal competency ratings were converted directly into a metric scale to enable subsequent statistical analysis. The level of "novice" became metric 1 up to "expert" with metric 5.

3.3 Data Evaluation

Initially, 268 questionnaires were digitized, but they needed to be cleaned in two rounds. Firstly, all datasets that only participated in one of the two self-assessment rounds were excluded. Therefore, these datasets only contained information either before or after the intervention, making it impossible to assess any changes. These datasets were excluded without replacement, affecting a total of 14 datasets, leaving 254 datasets remaining. In a subsequent cleaning round, all systematically completed questionnaires were to be excluded, as they could significantly reduce the reliability of the data.

During the survey, it was observed that some participants returned the questionnaires very quickly, leaving insufficient time to have properly read the individual questions. Consequently, it must be assumed that some participants provided random answers. To exclude these data from further analysis, questionnaires with noticeably short response times were examined for systematic response patterns. In some cases, this suspicion was confirmed when participants provided identical responses across all competencies in both the pre- and post-assessments. These data points were deemed unreliable and were excluded from the analysis to prevent them from compromising the validity and overall significance of the study's findings. These datasets were also excluded without replacement, assuming systematic completion of the questionnaire. In total, 12 questionnaires were affected, leaving a final count of 242 datasets for analysis.

During the process of digitizing the questionnaires, instances of deteriorated competence assessment were identified in certain cases. Specifically, participants reported a lower level of competence for individual competencies after the FabLab intervention compared to before it. This question was discussed with three participants after they had completed the questionnaire, who raised the issue during the open concluding session. All three participants attributed their reduced assessment to the realization, during the intervention, of the comprehensive nature of the competencies, leading to decreased self-confidence afterward. Thus, for these three respondents, there was not an actual decline in competencies, but rather a reevaluation of their previous assessment. In addition, a total of 30 other questionnaires exhibited a deterioration in at least one competency. However, due to anonymization, it was not feasible to follow up with the participants regarding this matter. Nonetheless, the data was still included in the analysis for further investigation, as a conclusive explanation for the phenomenon could not be determined.

The data analysis comprised three main steps. Initially, the database was thoroughly described using descriptive methods to identify typical characteristics. Furthermore, the target group was delineated more precisely to establish a foundation for generalizability, with a particular focus on analyzing the collected metadata for this purpose. Subsequently, the data relating to competency assessment was examined, with specific attention paid to the alterations between the pre- and post-surveys for each individual competency. This analysis involved examining frequencies, as well as calculating average values and deviations, to infer the impact of the intervention. Additionally, the significance and reliability of the findings were assessed using a t-test with paired variables, supplemented by effect size measurements. The following hypotheses apply to the analysis and interpretation of the t-tests:

H0: There is no significant difference between the average values of the competency levels of the pre- and post-assessment.

Accordingly, the alternative hypothesis is:

H1: There is a significant difference between the average values of the competency levels of the pre- and post-assessment.

Finally, an initial endeavor was made to construct a competence profile of the intervention based on the derived values. This entailed contextualizing changes in individual competencies relative to each other and determining the aggregated impact on overarching competency categories. All computations were executed automatically utilizing SPSS software. The methodological framework employed in this process aligns with comparable study approaches and established literature in the field (Stone, 2010).

3.4 Reliability Analysis

As described above, the 14 competencies are part of superordinate categories. The operationalization of the individual items and categories is based on Hellwig et al. (2021b). The Business Competency Framework developed there and its individual items and associated categories were empirically validated using two application scenarios. The present study represents a scenario in which individual competencies and categories of the framework were selected specifically for the evaluation of DIE interventions. Internal consistency of competencies and categories was therefore tested using a reliability analysis. Values above 0.7 are considered acceptable, values above 0.8 as good and above 0.9 as excellent (George & Mallery, 2003; Nunnally, 1978) Reliability analysis shows that all four categories of this study show acceptable to very good internal consistency. No items needed to be removed after reliability analysis. Since every item and category is evaluated twice - pre and post intervention - Cronbach's alpha values of both assessments are displayed in the table below.

Category	Number of Competencies/Items	Cronbach’s Alpha Pre / Post
Learning	4	0,854 / 0,864
Understanding	1	Not applicable
Analyzing	2	0,781 / 0,747
Creating	4	0,882 / 0,901
Communicating	3	0,861 / 0,884

Table 1: Reliability Analysis on Category Level

4. FINDINGS

The results of the statistical analysis of the data collection are presented below. The first step is to apply various descriptive methods in order to obtain a complete picture of the data set. The entire data set is then analyzed in order to understand the impact of the intervention. In a further step, group-specific analyses are carried out with the help of the additionally collected meta-data in order to gain a more comprehensive understanding of the optimal target group for the intervention.

4.1 Descriptive Statistics

After cleaning, 242 datasets are available for analysis. These will be descriptively analyzed herein. Of the 242 individuals considered, 196 (81%) were under 20 years old, 35 (14.5%) were between 20 and 30, 3 (1.2%) were between 30 and 40, and 4 participants each (1.7%) were between 40 and 50, and between 50 and 60. Regarding the highest level of education attained: 53 participants (21.9%) reported having no degree. Another

67 individuals (27.7%) possessed a high school equivalency diploma, while 84 participants (34.7%) held a high school diploma. Only 19 people (7.9%) had completed secondary education, and just 10 (4.1%) had completed vocational training. Finally, two individuals (0.8%) held a bachelor's degree, an additional 4 (1.7%) held a master's degree, and one person (0.4%) possessed a doctorate. Two individuals did not provide information on their highest educational qualification.

The group of participants was consistently accompanied by one to two supervisors who took charge of organizing the initiative. These supervisors also participated in the workshops but were typically older and more highly qualified than the regular participants. Overall, the educational level of the study group is notably below the average in Germany: in 2022, only 4.9% of the population in Germany had no educational qualifications, while an additional 24.2% had completed secondary education. Approximately 23.9% of the German population had attained a high school diploma or equivalent, while 36.7% possessed a higher-level diploma or degree (Statistisches Bundesamt, 2023). Hence, the background of the initiative, designed for individuals seeking vocational training, is reflected in the questionnaires.

Among the 242 participants considered, 215 (88.8%) reported never having been to a FabLab or similar facility (DIE) or participating in a comparable initiative before. Only 25 individuals (10.3%) had prior experience. Two questionnaires were incomplete in this regard.

Before analyzing the changes brought about by the intervention, the initial situation and the average profile of the participants should be shown. As shown in the chart below, a profile emerges across the 14 skills considered. With an average score of 1.78, the competence "Programming" is the worst assessed competence. On average, it is therefore well below the level of "Beginner". The competencies "Digital innovation" (1.81), "Understanding digital transformation" (1.86) and "Digital collaboration" (1.97) are also rated below this level. The majority of competencies are rated between 2 and 2.5 and are therefore in the low to medium "beginner" level. Three competencies are in the upper range of the "beginner" level with a value greater than 2.5: alongside "access to information" (2.58) and "digital learning" (2.58), "willingness to learn" is in first place with an average rating of 2.77.

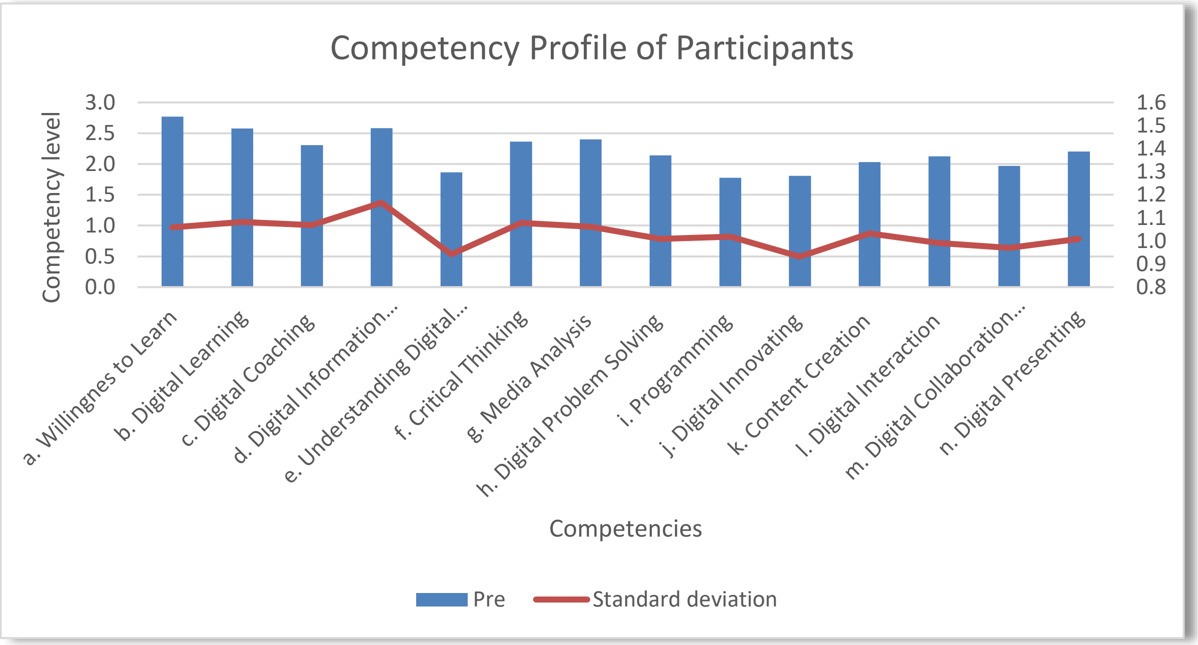

Figure 1: Participants Competency Profile

For superordinate categories, the “Creating” category was rated lowest with a mean value of 1.94 before the intervention. This was followed by the categories “Communicating” (2.10) and “Analyzing” (2.38). The highest competencies before the intervention were attested by the participants in the “Learning” category (2.56).

Across all competencies, the standard deviation between 0.932 and 1.166 is at a relatively high level. Respectively, standard deviation across categories is between 0.858 and 0.962. However, this is due to the highly subjective self-assessment of the participants, which forms the basis for the study. Even if an explanation of each individual competence level is included for better understanding, a self-assessment is always subject to a high degree of deviation within a heterogeneous group.

An initial superficial evaluation of the changes resulting from the intervention showed that the data set of 242 participants reported an improvement in competence in at least one skill in 207 cases. In contrast, 35 participants reported no change in their skills self-assessment as a result of the FabLab intervention. In the next step, a detailed analysis of the changes using t-tests with associated variables will provide further insights.

4.2 Competency Acquisition Analysis

Before carrying out the t-test, the data sets were first checked for possible quality defects. An exploratory data analysis was first used to search for outliers. No extreme outliers were identified in any of the competencies under consideration, so the data set was not adjusted. This validation was conducted automatically using SPSS. Due to a sufficiently large sample ($n>30$), a supplementary test for normal distribution was not carried out (Stone, 2010).

The paired variables t-test conducted using SPSS showed a significant change in the whole intervention and all 14 competencies examined. The two-sided p was <.001 for all competencies. For the whole dataset, difference before and after intervention was $t(205) = 16.165$, $p<.001$, showing a highly significant effect. In addition to significance, Cohen's d was used to calculate the effect size (Cohen, 2013). For the whole intervention, a large effect with $d=1.126$ is observed. With values between 0.644 and 1.050, the Cohen's effects can be rated as medium to large (Cohen, 2013). There are clear differences between the distinctive competencies. For example, the competencies "access to information" and "media analysis" were rated significantly higher after the DIE intervention with an improvement of .500, $t(237) = 10.955$, $p<.001$, $d=.700$ and $t(239) = 9.979$, $p<.001$, $d=.644$ respectively. This makes them the competencies with the smallest increase, however. With an average increase of .772, the competence "Digital innovation" is also significantly higher as a result of the FabLab event and has a particularly high effect size, $t(236) = 16.160$, $p<.001$, $d=1.050$. Just behind this, the competence "Programming" is assessed as being particularly influenced by the intervention with an average increase of .757 $t(238) = 14.654$, $p<.001$, $d=.948$.

For superordinate categories, intervention effects are medium to large: The smallest intervention effect is observed in the “Analyzing” category with an average increase of 0.500 with $t(236)=11.632$, $p<.001$, $d=.755$. The “Communicating” category shows an average competency increase of 0.549 with $t(234)=12.734$, $p<.001$, $d=.831$. Even stronger intervention effects were observed in the "Learning" and "Creating" categories: For “Learning”, an average increase of 0.556 with $t(223)=15.086$, $p<.001$, $d=1.008$ and for “Creating”, an average increase of 0.714 with $t(232)=17.139$, $p<.001$, $d=1.123$ are reported. This states that participants in this study feel particularly empowered by those FabLab intervention categories that are associated with learning digital skills and creating independently, using digital technologies. Interestingly, highest competence increases are reported in those categories that were assessed with the lowest (“Creating” category) and highest (“Learning” category) mean value before intervention.

This shows that a particularly strong improvement was recorded in the competencies that were initially assessed as comparatively low or high. The assumptions made during the pre-selection of the competencies under consideration were also confirmed, as all the competencies examined showed a significant increase as a result of the intervention.

Below is an overview of the results of the t-test across all the variables examined.

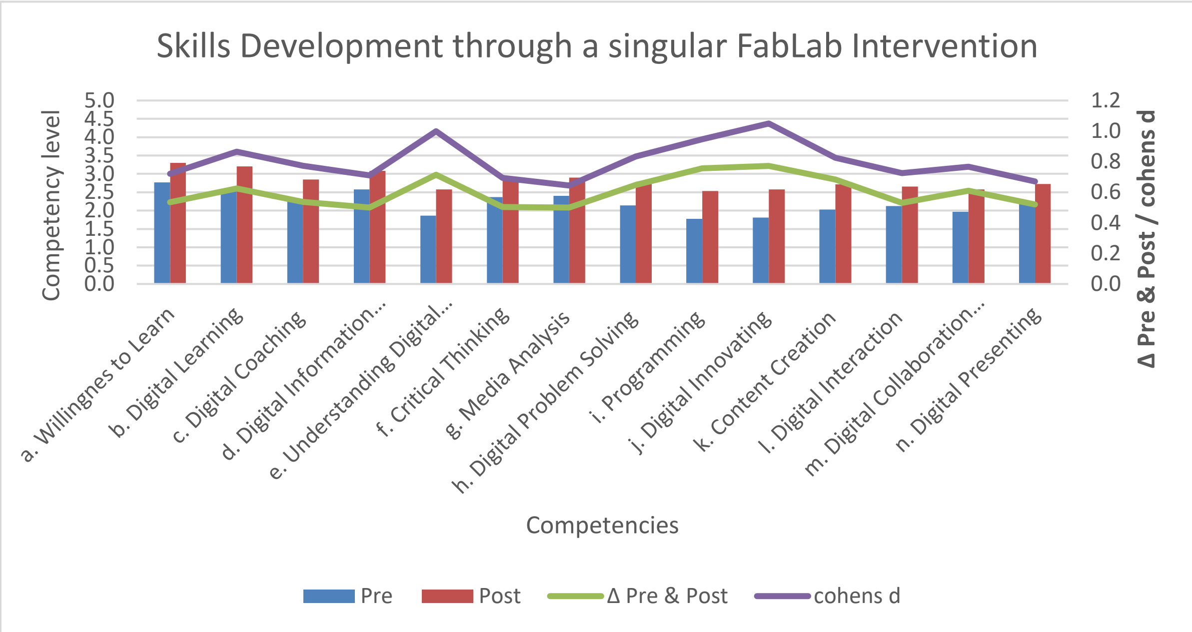

Figure 2: Competency Development through FabLab Intervention

4.3 Investigation of specific Groups on Competency Level

After a significant impact could be demonstrated in all 14 competencies considered, additional differentiations were to be made in a second step. The additional metadata collected was used to identify target groups on which the intervention had a particularly strong effect. For this purpose, the three criteria were to be examined more closely as influencing factors: Previous experience, level of education and age.

The mixed ANOVA (also: mixed analysis of variance) method was chosen to analyze the present data, as it is particularly suitable for study designs in which both within- and between-subject factors must be taken into account (Tabachnick & Fidell, 2019). The present study examines how a dependent variable (“ALL”) changes over two points in time (pre/post) (within-subject factor: time) and whether these changes differ between different groups defined by categorical characteristics such as experience, age or educational background (between-subject factors).

Mixed ANOVA is the appropriate method for identifying interactions between these two levels - for example, whether the effect of the time factor (e.g. learning effect or skill growth) depends on group membership (Field, 2024; Tabachnick & Fidell, 2019). It thus enables the simultaneous consideration of main effects (e.g. time or group membership) and interaction effects (e.g. time × experience), which allows more differentiated statements to be made about change processes in different subgroups.

A further advantage of mixed ANOVA lies in its efficiency in repeated measurements, as it controls for within-subject variability and thus enables higher statistical power compared to purely between- or within-factorial designs (Cousineau, 2005). Even with moderate deviations from the normal distribution - such as those partially observed in the present study - mixed ANOVA is considered a robust method with sufficiently large samples (Blanca Mena et al., 2017). In view of these methodological strengths, mixed ANOVA was chosen as the main analytical method to analyze changes over time and to identify possible differences in these changes between the defined subgroups.

4.3.1 Assumptions for Mixed ANOVA Analysis

The implementation of a mixed ANOVA requires certain prerequisites with regard to scale level, distribution assumptions, independence of the measurements and data quality (Field, 2024; Tabachnick & Fidell, 2019). These were carefully examined as part of the present analysis.

The dependent variable "ALL" was measured as the difference between two points in time (pre/post) on an interval scale and thus fulfills the requirements for the use of parametric methods. The between-subject factors age (age2), level of education (edu16) and experience (experience) are nominally scaled and independent of each other. The within-subject factor time (t1 = pre, t2 = post) was collected separately within the sub-samples and therefore also fulfills the requirement of independence between the measurement times.

To test the normal distribution assumption, Kolmogorov-Smirnov and Shapiro-Wilk tests were carried out for the dependent variable "ALL" at both measurement times (ALL_pre and ALL_post), separately for each of the subgroups under investigation. For the group with no previous experience ($n > 30$), for example, both the Kolmogorov-Smirnov test ($D = 0.066$, $p = .023$) and the Shapiro-Wilk test ($W = 0.966$, $p < .001$) showed a significant test result at the first measurement time point (ALL_pre). The Shapiro-Wilk test ($p = .017$) also showed a significant deviation at the second measurement time point (ALL_post), while the Kolmogorov-Smirnov test did not reach significance with a p-value of .096. This indicates slight to moderate deviations from the normal distribution. In the group with previous experience ($n = 25$), on the other hand, there were no significant deviations in either test (ALL_pre: $p = .581$; ALL_post: $p = .437$), meaning that the distribution in this group can be assumed to be normal. These tests were carried out for the individual subgroups with similar results: Individual groups show slight to moderate deviations from the normal distribution. Q-Q diagrams were therefore also created to visually assess the distribution shape. These confirmed the results in the group with no previous experience, for example, in that there were minor deviations in the marginal areas, while the more experienced group showed broad agreement with the theoretical normal distribution. Despite individual significant test results, it should be noted that the mixed ANOVA is considered to be relatively robust against moderate violations of the normal distribution assumption - especially for group sizes above 30, as is the case for all subgroups except for the experienced group. The distribution assumption is therefore rated as sufficiently fulfilled.

Potential outliers were also identified to ensure data quality. Five cases (IDs: 150, 240, 151, 188, 199) showed conspicuous deviations from the overall data set. These were excluded for methodological reasons so as not to impair the validity of the analysis.

Overall, the central requirements for carrying out a mixed ANOVA are therefore met. The analysis can therefore be classified as methodologically viable in order to reliably investigate differences over time and between the groups.

4.3.2 Differentiation by prior Experience

A mixed ANOVA with the within-subject factor time (pre vs. post) and the between-subject factor experience (no previous experience vs. previous experience) was carried out to investigate possible differences in competence growth depending on previous experience. The aim was to analyze the extent to which the subjectively assessed competencies change over time and whether this change is influenced by existing prior content-related experience.

Before conducting the mixed ANOVA, all central prerequisites were checked. The assumption of sphericity was automatically dropped at two measurement points (Field, 2024), so that no Mauchly test was required. The equality of the error variances at both time points was confirmed by the Levene test ($p > .29$), as was the homogeneity of the covariance matrices by the Box test (Box's $M = 1.647$, $p = .661$). These results justify the use of a mixed ANOVA without additional corrections (Blanca Mena et al., 2017; Tabachnick & Fidell, 2019).

The analysis initially showed a significant main effect for the within-subject factor time, $F(1, 233) = 87.21$, $p < .001$, $\eta^2_p = .272$, which corresponds to a medium to strong effect (Cohen, 2013). Regardless of group affiliation, the participants recorded a significant increase in their subjective perception of competence between the first ($M = 2.18$) and second measurement time point ($M = 2.77$). This finding indicates an overarching learning effect as a result of the measure carried out.

In addition, there was a significant main effect for the intermediate subject factor Experience, $F(1, 233) = 15.38$, $p < .001$, $\eta^2_p = .062$, which indicates a small to medium effect. Participants with previous experience ($n = 23$) consistently achieved higher competence scores than those without previous experience ($n = 212$), both before ($M = 2.81$ vs. $M = 2.11$) and after the measure ($M = 3.22$ vs. $M = 2.72$). This underlines that existing prior knowledge is associated with higher self-efficacy and perceived competence, which has also been demonstrated in other learning and training contexts (Bandura, 2012; Ericsson et al., 1993).

The interaction between time and experience was borderline non-significant, $F(1, 233) = 3.31$, $p = .070$, $\eta^2_p = .014$. While this does not indicate a statistically significant difference in the course of competence development between the groups, the small effect trend suggests that people without previous experience may have benefited more from the measure - even if this difference does not exceed the conventional significance level. The literature points out that interactions with small effect sizes ($\eta^2 < .02$) may have practical relevance in larger samples or with more specific measurement instruments (Lakens, 2013).

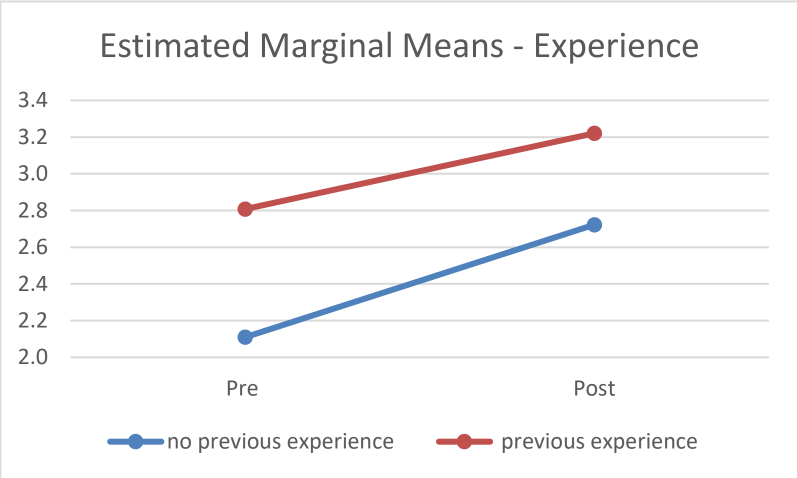

Figure 3 : Estimated Marginal Means - Experience

In summary, the analysis shows that there is both a general increase in competence over time and stable differences between people with and without previous experience. However, the progression of competence gain over time is largely parallel in both groups, which is supported by the lack of a significant interaction. These results suggest that the measure is effective regardless of prior knowledge, but that experienced participants consistently benefit from a higher starting level.

4.3.3 Differentiation by Age

The mixed ANOVA was also carried out with regard to the influence of age (categorized as under 20 years (n=193) vs. over 20 years (n=44), variable age2) on subjective competence development. The aim was to analyze whether the increase in competence differs significantly between younger and older participants. Even if the differentiation of age was made in smaller steps during the data collection, the groups >20 years were combined in the evaluation, as they only had a small number of participants, so that there would not be a sufficient data basis for a meaningful evaluation.

As with the previous analyses, it was also checked for this evaluation whether the central assumptions for the application of a mixed ANOVA were fulfilled. The Mauchly test to check the assumption of sphericity is not necessary with only two measurement times (pre and post), as sphericity is automatically given (Field, 2024). The Levene test confirmed the homogeneity of the error variances for both time points (ALL_pre: $p = .679$; ALL_post: $p = .461$), and the box test for equality of the covariance matrices also remained non-significant (Box's $M = 12.029$; $p = .088$), which justifies the use of mixed ANOVA based on a mixed design (Tabachnick & Fidell, 2019).

As in the other group analyses, there was also a highly significant main effect of the within-subject factor time, $F(1, 235) = 159.52$, $p < .001$, $\eta^2_p = .404$. This is a strong effect that confirms that the subjectively assessed skills increased significantly in both age groups after the measure was implemented. The mean value increased from $M = 2.09$ to $M = 2.71$ for those under 20 and from $M = 2.55$ to $M = 3.00$ for those over 20.

In addition, a significant main effect of the between-subjects factor age2 was demonstrated, $F(1, 235) = 9.91$, $p = .002$, $\eta^2_p = .040$. The participants aged over 20 showed significantly higher competence values overall across both measurement times. This may be explained by differences in previous experience, maturity or professional background and is consistent with previous studies on age-related self-efficacy (Bandura, 2012; Lachman et al., 2011).

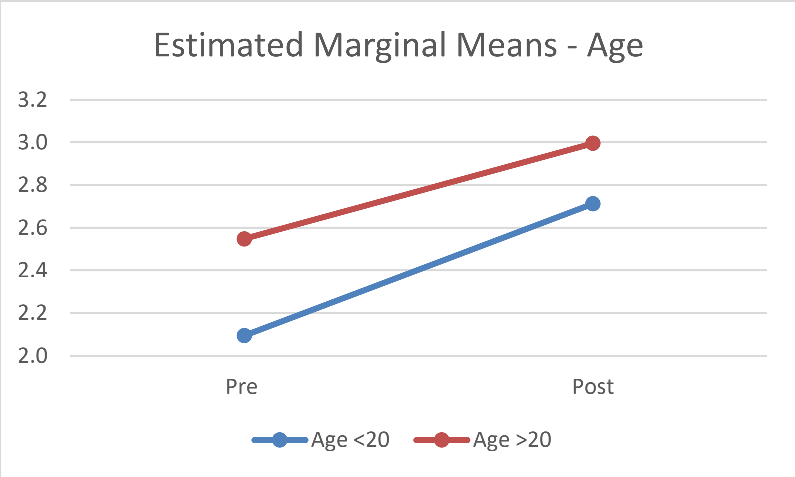

Figure 4: Estimated Marginal Means - Age

In contrast to the analysis according to previous experience, a significant interaction effect was found with regard to age, $F(1, 235) = 4.10$, $p = .044$, $\eta^2_p = .017$. This indicates that the increase in competence differs significantly between the two age groups: The older participants (> 20 years) report an above-average increase in their subjective competence assessments compared to the younger group. Although the descriptive mean difference between the measurement times is numerically greater in the younger age group ($\Delta = 0.62$) than in the older group ($\Delta = 0.45$), the inferential statistical analysis nevertheless indicates a significant interaction effect ($p = .044$, $\eta^2_p = .017$) in favor of the older participants. This apparent contradiction can be explained by the fact that the mixed ANOVA does not only evaluate the difference in mean values, but also takes into account the dispersion within the groups. While the younger group with greater variance shows a more widely spread response behavior, the increase in the older group is more consistent and therefore statistically more robust. The significant interaction effect thus indicates that the effect of the measure is more reliable in the group of over 20-year-olds - even if the absolute mean difference is smaller. This result underlines the importance of interpreting both descriptive and inferential statistical findings in a differentiated manner in terms of their respective significance. This finding is particularly relevant for the differentiation of educational measures according to age allies and underlines the need to take target group-specific differences into account in interventions.

4.3.4 Differentiation by Level of Education

As part of the evaluation, it was further investigated whether the perceived increase in competence differs depending on the level of education. As previous test constellations with four or more levels of education (e.g. no degree, high school equivalency diploma, high school diploma, secondary education, university degree) violated the requirements of the ANOVA - in particular the box test for equality of the covariance matrices - a new grouping was carried out in the interests of statistical validity. All cases with no degree, high school equivalency diploma, high school diploma were grouped together in Group 1 (lower education/edu1 (n=128)), secondary education, bachelor's degree and master's degree were grouped together in Group 2 (higher education/edu2 (n=107)).

All central requirements were met for the mixed ANOVA carried out with the Within factor Time (Pre vs. Post) and the Between factor Education (two groups). The Mauchly test to check the sphericity was omitted at two measurement points. The Levene test showed no significant differences in the error variances at either time point (ALL_pre: $p = .947$; ALL_post: $p = .615$), and the box test for equality of the covariance matrices was also not significant (Box's $M = 4.317$, $p = .233$). The methodological requirements for the mixed ANOVA are thus fulfilled (Blanca Mena et al., 2017; Field, 2024).

A highly significant main effect was found for the within-subject factor time, $F(1, 233) = 304.17$, $p < .001$, $\eta^2_p = .566$. This confirms the strong effect of the implemented measure on the subjective perception of competence, regardless of the level of education. Both groups show a significant increase: Group 1 (no degree/main school/training) increased on average from M = 1.95 to M = 2.60, while Group 2 (intermediate school-leaving certificate or higher) increased from M = 2.46 to M = 2.96.

In addition, there was a significant main effect of the education factor, $F(1, 233) = 23.66$, $p < .001$, $\eta^2_p = .092$. Across both time points, people with a higher level of education rated themselves as significantly more competent than participants with a lower level of education. This effect confirms previous research findings according to which the level of education is closely linked to confidence in digital skills (van Deursen & Helsper).

The significant interaction effect between time and education is particularly relevant, $F(1, 233) = 5.36$, $p = .021$, $\eta^2_p = .022$. This finding shows that the strength of the increase in skills varies significantly between the education groups. The analysis of the mean values suggests that participants with a lower level of education in particular reported an above-average increase in their subjective perception of competence. This result suggests that target groups with a lower level of education particularly benefit from low-threshold, practice-oriented learning formats such as those in this project.

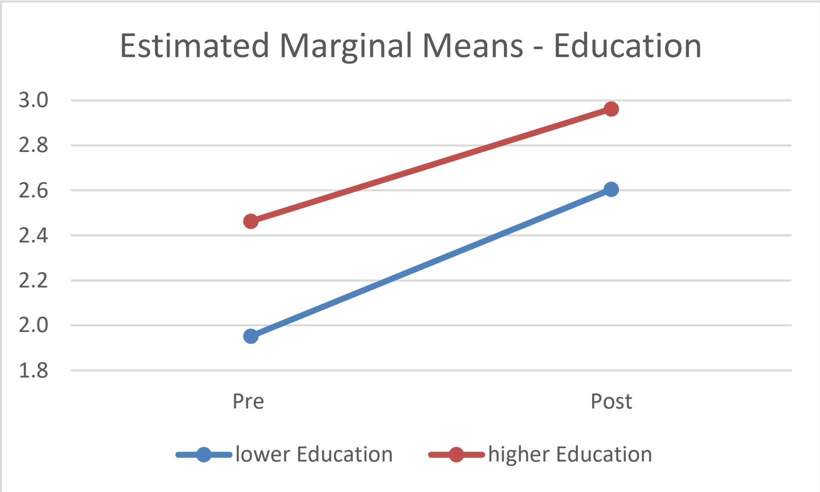

Figure 5: Estimated Marginal Means - Education

5. DISCUSSION

The discussion of our paper focuses on the evaluation of Digitalized Innovation Environments, specifically FabLabs, and their effectiveness in promoting digital competencies. The results demonstrate a significant improvement in a range of digital competencies following participation in a specifically tailored FabLab intervention. These findings align with previous research highlighting the role of DIEs as catalytic environments for learning and applying digital technologies (González-Nieto et al., 2020; Hippel, 2007; Iansiti & Lakhani, 2014).

The pronounced enhancement observed in competencies such as "Digital Innovation" and "Programming" underscores the importance of practical experiences and experimental learning facilitated in FabLabs (Papavlasopoulou et al., 2017). These results are in line with Cutcher-Gershenfeld´s (2018) insights into the potential of personal fabrication technology to foster innovation skills. Moreover, our findings reflect the observations of Nambisan et al. (2017), emphasizing the transformative role of digital innovations in the learning process (Vega & Chiasson, 2019). In relation to the research question, it can be clearly confirmed that a DIE intervention has a significant effect on the acquisition of competencies in general. Furthermore, with the help of the chosen methodology, it was also possible to identify particularly addressed skills and thus derive a kind of skills profile for the intervention carried out. In addition to validating the methodology, further valuable insights were gained with regard to the impact and further research approaches.

Our study shows that average self-reported improvement of competencies is highest in those superordinate categories that were rated lowest and highest before intervention. This suggests that our intervention particularly strengthened competencies where (1) the participants had comparatively low self-assessed competencies and therefore above-average potential for improvement and (2) the participants were able to benefit particularly in those competencies in which they had already achieved a significant level of competence that they were able to utilize and improve upon.

Interestingly, our study revealed that older (>20 years) participants and those with lower educational backgrounds experienced the greatest increases in competency. This suggests that DIEs could be particularly valuable for demographics traditionally underrepresented or with less access to technological resources (González-Nieto et al., 2020). This observation is consistent with the work of Zakoth and Mauroner (2020), highlighting the inclusive potential of makerspaces and FabLabs to engage broader populations in the innovation process. The results of our study underscore the potential of DIEs, especially FabLabs, as innovative educational tools that can contribute to closing the digital skills gap (Saorín et al., 2017). By providing hands-on learning experiences and access to modern technologies, these environments offer unique opportunities for learners of all ages and educational backgrounds. The significant improvement in digital competencies emphasizes the effectiveness of DIEs in promoting key skills increasingly demanded in today's workforce and society.

Furthermore, the role of social interaction in DIEs should not be underestimated. The collective dynamics and peer-to-peer exchange, as discussed in studies by Capdevila (2014) and Suire (2016), significantly contribute to the learning experience and may represent an important dimension of competency development warranting further exploration. Various aspects of social interaction were also observed during this study. Participants supported each other during the intervention and engaged in friendly competition to outperform one another. This suggests that the collaborative work environment and the open intervention structure may have contributed to a higher level of skill acquisition than would have been achieved through self-study alone. However, since social interaction was not a central research focus of this study, no specific data were collected to allow for a scientifically grounded conclusion.

In summary, our study highlights the need for targeted design of DIE interventions to maximize learning outcomes, as different groups of participants responded differently to the intervention, even though all generally benefited. Tailoring programs to specific target group needs, as proposed by Hellwig et al. (2021b), could be a key factor in effectively harnessing DIEs as educational tools. The study results provide perspectives and emphasize the value of competency assessment for designing future educational programs tailored to the specific needs and prior knowledge of learners.

By incorporating methods of experimental learning and peer collaboration, DIEs can serve as models for innovative educational concepts that transcend traditional classroom boundaries. Further research is needed to identify best practices for the design and implementation of such interventions and to enhance the accessibility and effectiveness of these innovative learning environments.

The scalability of DIEs such as FabLabs poses a significant challenge closely linked to their ability to support broad educational and innovation goals. Our study demonstrates that FabLabs can bring about significant improvements in digital competencies, raising questions about their expansion and integration into broader education and innovation ecosystems. Despite the potential for comprehensive competency development, FabLabs in their current form are often limited by resource constraints, accessibility, and sustainability issues (Hellwig et al., 2021c). Expanding the reach of these environments requires strategic planning regarding financing, management, assessment and program design to ensure demand-based and high-quality learning experiences while increasing accessibility. Drawing on works by Böhmer et al. (2015) and Wolf et al. (2014), which examine the implementation and operation of DIEs in various contexts, partnerships between public institutions, educational sectors, and the private sector can play a key role in the scaling strategy.

By using a one-group pretest-posttest design, the present study adopts a proven approach from educational research that has proved particularly successful in intervention-based practical studies (Dimitrov & Rumrill, 2003; McMillan, 2012). The combination with mixed ANOVA made it possible to analyze both intra-individual competence developments and group-specific differences in a statistically differentiated manner - an approach that can also be found in comparable studies on the effectiveness of learning environments with a digital focus (Papavlasopoulou et al., 2017; Saorín et al., 2017).

Compared to other studies in the context of digital skills development (European Commission, 2013, 2017), this study broadens the perspective methodologically by not only looking at skills gains at an aggregated level, but also enabling differentiated skills profiles. While many studies focus on individual competencies or generalized digital literacy scores, the chosen approach offers a scalable and theory-based framework for measuring competencies - especially for application-oriented, hands-on learning settings such as DIEs.

The use of self-assessment based on the Dreyfus model is not uncommon in exploratory competence studies (George & Mallery, 2003), but should be triangulated with objective competence tests or behavioural observations in future research in order to minimize biases due to social desirability or limited self-assessment competence (Hattie & Timperley, 2007). In the area of digital skills in particular, it has been shown that subjective and objective assessments can sometimes diverge greatly (van Laar et al., 2017).

The chosen methodology also offers high transfer potential for further studies: by adapting the underlying competency model (Hellwig et al., 2021a) and standardized pre-/post-measurements, different DIE formats could be evaluated comparatively. This opens up new perspectives for meta-analyses and international comparative studies, as required in the context of digital education.

The discussion should also critically consider the limitations of our study. While the results demonstrate positive developments in digital competencies, participant self-assessment is subjective and could be complemented by more objective measurement. To fully exploit the potential of DIEs, further research is needed to explore the long-term effects of DIE interventions, the transferability of acquired competencies across different life and work domains, and the development of effective scaling and sustainability strategies. This forward-looking research could help strengthen the role of DIEs in the global education landscape and establish them as essential components of an inclusive and innovation-driven society.

6. LIMITATIONS

With its large number of participants, this study is one of the most comprehensive to examine the impact of interventions within a DIE. It is based on sound studies and established methods. Nevertheless, some approaches need to be critically reflected upon in order to adequately assess the validity of the study and to provide valuable information for future research.

The use of self-assessment tests is inherently associated with certain risks. In addition to measuring actual competency development, factors such as the desire to meet perceived expectations or social pressure may influence participants to report improved competency levels. Without further investigation of participants' competencies through objective tests, such inaccuracies cannot be entirely ruled out.

Given the large sample size in this study, conducting extensive competency assessments was not feasible. This limitation was particularly significant since a broad spectrum of competencies was addressed, making comprehensive testing both complex and time-consuming. Additionally, the absence of a control group that participated in a comparable intervention limits the study's ability to isolate the effects of the intervention. Due to time and resource constraints, establishing a control group was not viable within the scope of this research and must therefore be acknowledged as a limitation. Despite these constraints, the study provides valuable insights into how interventions in DIE can be leveraged for competency development and highlights potential focus areas for future initiatives.

Further, the pre-selection of 14 of the original 32 competencies of the initial model should be noted. By selecting competencies that were expected to be influenced by the intervention, the study shows a lack of reference competencies. Including all 32 competencies would have provided unexpected insights and revealed a more complete competency profile of the applied intervention. However, including all 32 competencies would have been too extensive for the group of participants, given their limited attention span. If the questionnaire had been more than twice as long, the quality of the data would have been significantly lower, making it impossible to generalize.

In this context, the phenomenon of negative skill development must also be addressed. Individual participants indicated that their individual skills had deteriorated as a result of the intervention. In response to specific questions from the principal investigator, participants explained this effect as a result of a more comprehensive understanding of the individual competencies and a better reflection of their own abilities after the intervention. Due to the small number of cases of this phenomenon, they were not evaluated in the study. However, it should be noted that the results are slightly affected by this. Furthermore, there is suspicion that some participants systematically filled out the questionnaires without engaging in genuine reflection. Since no safeguard instrument, such as an attention check question, was implemented in the questionnaire design, systematic responses were subsequently identified through pattern recognition. Consequently, the possibility of misclassification cannot be ruled out.

The five-level Dreyfus self-assessment model is an established model, but may not be designed for a very short intervention such as the one in this study. An increase of one full level (the smallest measurable unit in the study design) within one day would have a very large impact. Nevertheless, the analyses showed a significant increase. However, the extent to which this increase is due to the actual level of competence with a corresponding level definition would require further investigation. As with all self-assessment studies, the results should be viewed qualitatively rather than quantitatively. Individual changes should always be evaluated in relation to other competencies. The absolute values can only be transferred to other studies to a limited extent.

In conclusion, it can be recommended for future research that the data collection be carried out digitally. In addition to facilitating the evaluation, further quality assurance measures could be taken. For example, the time taken to complete the questionnaire could indicate whether the content was read with sufficient attention. This is not recorded in analog questionnaires, so it is possible that systematically completed questionnaires were included in the study analysis.

7. OUTLOOK AND CONTRIBUTION

The study on the impact of a specific DIE intervention provides a solid basis for further research in a number of areas and thus makes a valuable contribution to a better understanding of the DIE phenomenon. First of all, the methodology presented provides a structured template for further interventions that can be compared with each other using the same approach. The methodology has already demonstrated that it is suitable for creating profiles of interventions that offer solid comparability and a scientifically sound selection of suitable interventions for specific target groups. In order to simplify the applicability of the proposed methodology, a further step would be to investigate in more detail and identify recommendations for action for the competencies to be assessed. As a fully comprehensive survey of 32 competencies is also viewed critically with other target groups, a factor analysis would be helpful. This allows superfluous competencies to be deleted and a simplified model to be used that does not break down at the level of individual competencies, but at the level of competency categories. This would also enable a standardized continuous evaluation of a large number of DIE interventions without specific adjustments to the instruments.

In addition to this contribution and supplementary research approaches with regard to methodology, the results of the study also provide a fundamental basis for further research and thus make a valuable contribution to the real nature of the DIE phenomenon. For example, the revision of the intervention with regard to its stronger focus on participants with higher levels of education provides further insights into how the DIE toolbox can be used for specific target groups. Efforts could also be evaluated that aim to promote competencies that are currently less addressed.

Finally, the study also represents a central building block for theory-building by identifying the basic modes of action of DIEs and demonstrating their function as a competency incubator. This confirms a potential of DIEs that has already been identified in theory (Hellwig et al., 2021c) and opens the door to further investigation of the application scenarios of DIEs.

8. CONCLUSION

Digitalized innovation environments have increasingly become a focus of research in recent years. This paper makes a valuable contribution to a better understanding of this phenomenon by validating the potentials already examined theoretically and known from other contexts for the first time as part of a comprehensive quantitative data collection. In a data set of n=242, significant increases in competency levels were demonstrated as a result of a specific FabLab intervention. The intervention was designed to make the maximum benefit of the DIE infrastructure and to take advantage of the specific characteristics of a DIE. By validating 14 different digital competencies across several categories, it was also possible to derive a kind of competence profile for the intervention. On a five-point scale according to Dreyfus (1980), an average improvement of .603 competence levels with a strong intervention effect was achieved.

The categories related to acquiring, accessing and disseminate knowledge using digital technologies (categorized as learning competencies) and related to developing ideas or creating and programming content using suitable digital technologies (categorized as creating competencies), are promoted highest by the intervention.

The range of average increases in competence levels was between .500 for "Digital Information Seeking" and "Media Analysis" and .772 for "Digital Innovating". An additional differentiation of the participants in terms of previous experience, level of education and age also indicated differences in the effect size of the intervention. This suggests that target groups can be specifically addressed through targeted intervention design. In the present study, participants over the age of 20 who generally have a low level of education and no previous experience in a DIE were to be addressed in particular, which was successful in view of the greatest increase in competence in this target group. Participants under 20 years of age and with prior experience in a DIE tend to profit mostly in creating-related competencies, emphasizing DIE programs more focussed on creating and less on analyzing competencies when addressing this target group.

The transferable methodology also makes it possible to apply it to other DIE interventions, so that target group-specific interventions can be selected in the future. Further development of the methodology would enable a standardized evaluation of DIE interventions, taking into account all 32 competencies of the underlying competency framework (Hellwig et al., 2021a). The methodology's emphasis on a structured, empirical approach to evaluating digital competencies sets a precedent for future research in this field, promising valuable insights into the pedagogical potential of DIEs.

In summary, it can be stated that DIEs can play an important role in the acquisition of digital competencies if the formats used are appropriate for the target group. The present study thus forms a central building block for further research into the DIE phenomenon and makes a valuable contribution to theory development.

Statements

Data availability The data that support the findings of this study are available from the corresponding author upon request. The data are not publicly available due to privacy or ethical restrictions.

Declarations

Financial interests The author has no relevant financial or non-financial interests to disclose.

Conflicts of interest There is no conflict of interest.

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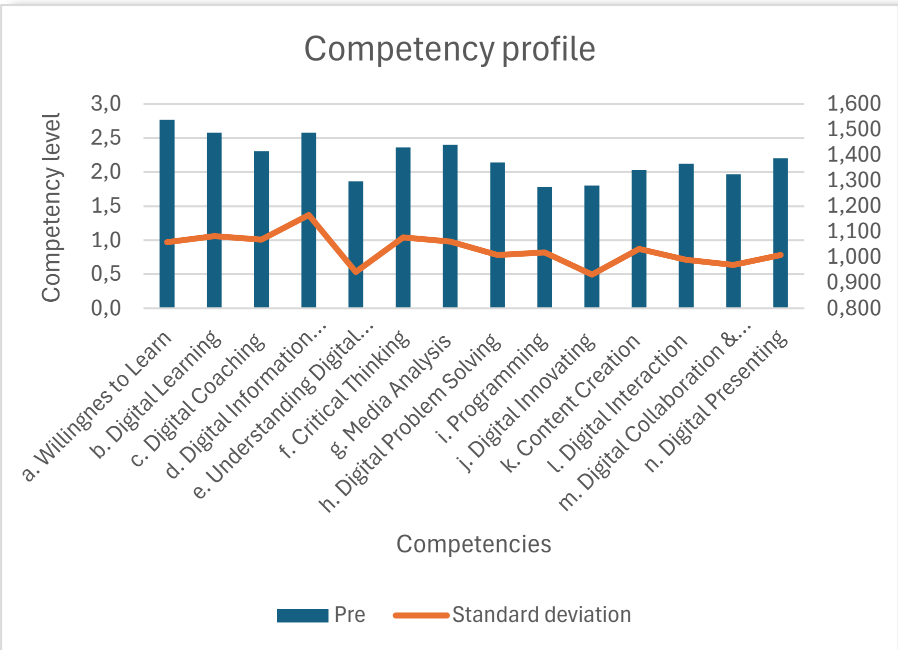
a. Willingnes to Learn
b. Digital Learning
c. Digital Coaching
d. Digital Information Seeking
e. Understanding Digital Transformation
f. Critical Thinking
g. Media Analysis
h. Digital Problem Solving
i. Programming
j. Digital Innovating
k. Content Creation
l. Digital Interaction
m. Digital Collaboration & Cooperation
n. Digital Presenting

All

Comp	Mittelwert	Standard deviation	T	df	Zweiseitiges p	Effektgröße tzung / (cohens) d
a	0,534	0,742	11,015	233	0,000	0,720
b	0,625	0,722	13,187	231	0,000	0,866
c	0,538	0,696	11,970	239	0,000	0,773
d	0,500	0,704	10,955	237	0,000	0,710
e	0,715	0,716	15,310	234	0,000	0,999
f	0,504	0,728	10,689	237	0,000	0,693
g	0,500	0,776	9,979	239	0,000	0,644
h	0,647	0,775	12,880	237	0,000	0,835
i	0,757	0,799	14,654	238	0,000	0,948
j	0,772	0,736	16,160	236	0,000	1,050
k	0,683	0,828	12,782	239	0,000	0,825
l	0,532	0,734	11,157	236	0,000	0,725
m	0,611	0,796	11,864	238	0,000	0,767
n	0,521	0,776	10,399	239	0,000	0,671



without Experience

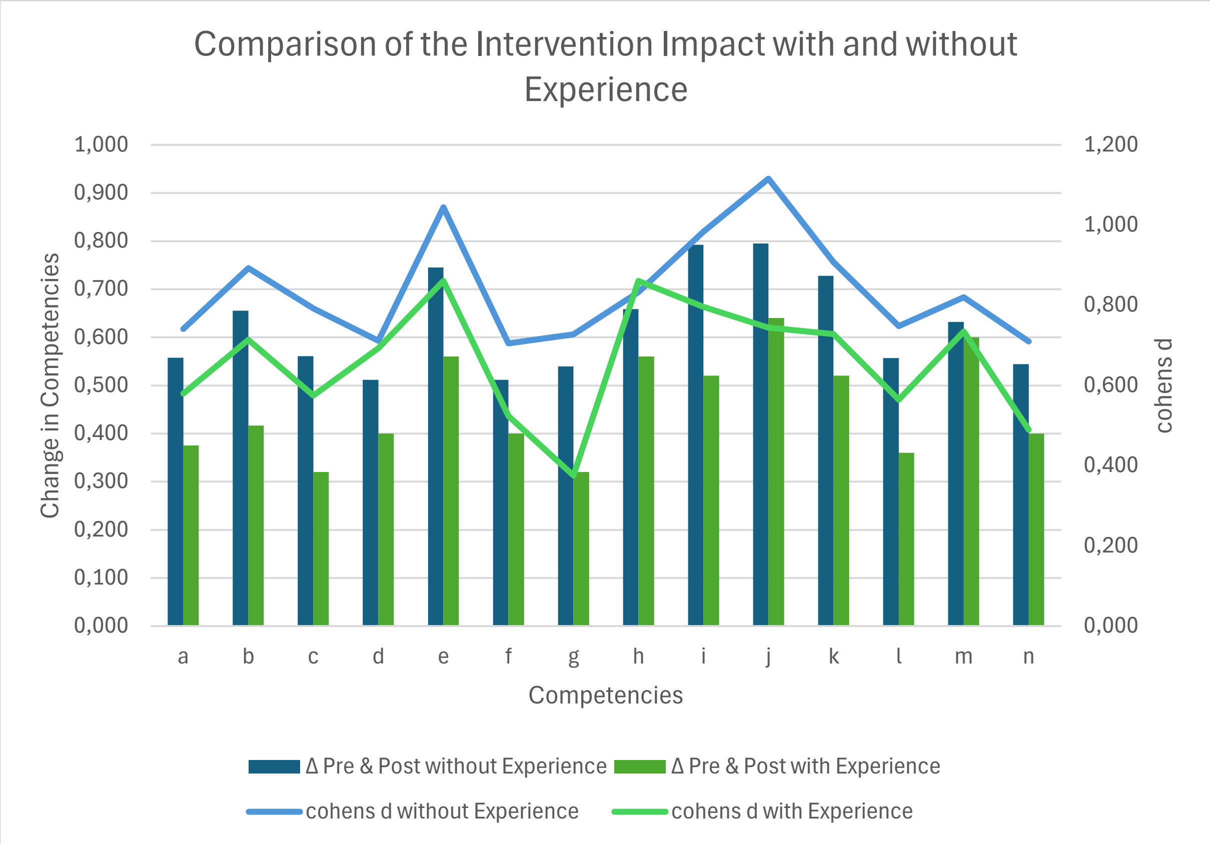
	Post without	Standard deviation	T	df	Zweiseitiges p	without Experienc
a	0,558	0,753	10,684	207	0,000	0,741
b	0,655	0,734	12,810	205	0,000	0,892
c	0,561	0,708	11,589	213	0,000	0,792
d	0,512	0,720	10,333	210	0,000	0,711
e	0,745	0,714	15,055	207	0,000	1,044
f	0,512	0,726	10,239	210	0,000	0,705
g	0,540	0,743	10,611	212	0,000	0,727
h	0,659	0,791	12,096	210	0,000	0,833
i	0,792	0,805	14,326	211	0,000	0,984
j	0,795	0,713	16,167	209	0,000	1,116
k	0,728	0,802	13,250	212	0,000	0,908
l	0,557	0,744	10,846	209	0,000	0,748
m	0,632	0,771	11,943	211	0,000	0,820
n	0,545	0,767	10,358	212	0,000	0,710

0,628

with experience

	Post with Experienc	Standard deviation	T	df	Zweiseitiges p	with Experienc
a	0,375	0,647	2,840	23	0,009	0,580
b	0,417	0,584	3,498	23	0,002	0,714
c	0,320	0,557	2,874	24	0,008	0,575
d	0,400	0,577	3,464	24	0,002	0,693
e	0,560	0,651	4,303	24	0,000	0,861
f	0,400	0,764	2,619	24	0,015	0,524
g	0,320	0,852	1,877	24	0,073	0,375
h	0,560	0,651	4,303	24	0,000	0,861
i	0,520	0,653	3,980	24	0,001	0,796
j	0,640	0,860	3,720	24	0,001	0,744
k	0,520	0,714	3,641	24	0,001	0,728
l	0,360	0,638	2,823	24	0,009	0,565
m	0,600	0,816	3,674	24	0,001	0,735
n	0,400	0,816	2,449	24	0,022	0,490

0,457



Comparison of the Intervention Impact with and without Experience
1,000
0,900
0,800
0,700
0,600
0,500
0,400
0,300
0,200
0,100
0,000
Change in Competencies
1,200
1,000
0,800
0,600
0,400
0,200
0,000
cohens d
a
b
c
d
e
f
g
h
i
j
k
l
m
n
Competencies
Δ Pre & Post without Experience
Δ Pre & Post with Experience
cohens d without Experience
cohens d with Experience

under 20 Years

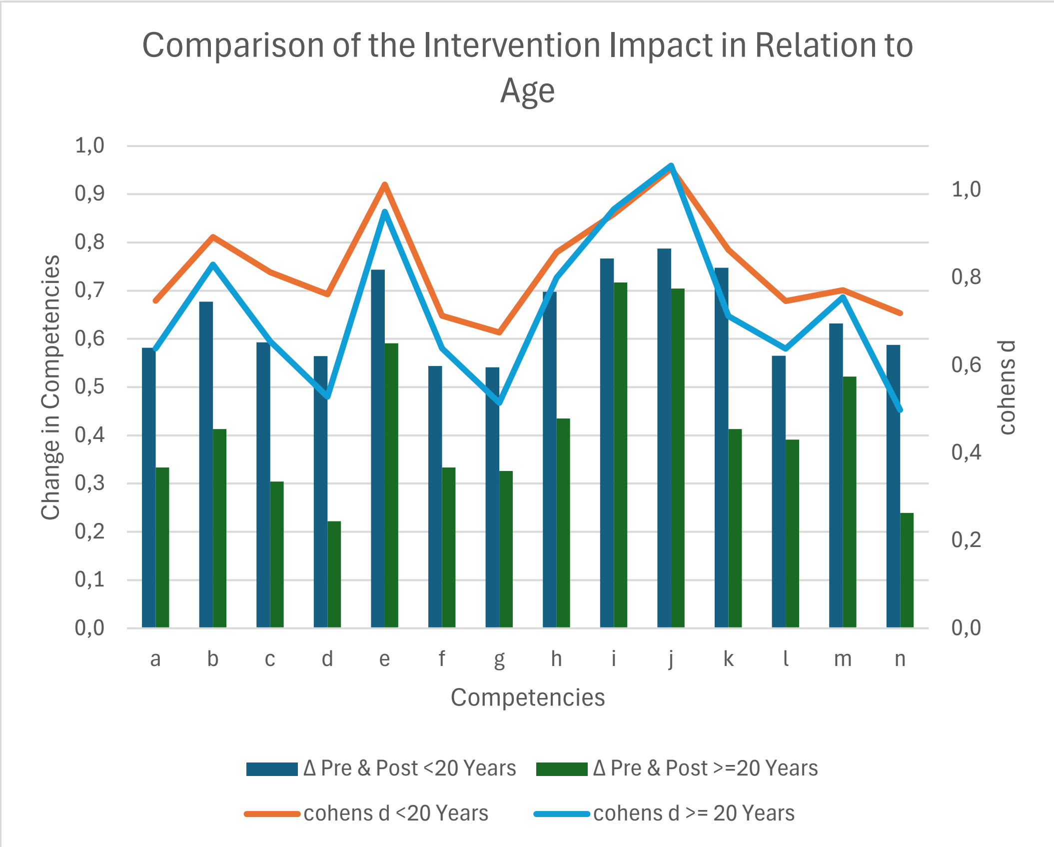
	Post <20 Years	Standard deviation	T	df	Zweiseitiges p	cohens d <20 Years
a	0,582	0,779	10,276	188	0,000	0,747
b	0,677	0,759	12,168	185	0,000	0,892
c	0,593	0,730	11,311	193	0,000	0,812
d	0,565	0,741	10,588	192	0,000	0,762
e	0,743	0,734	13,994	190	0,000	1,013
f	0,544	0,763	9,901	192	0,000	0,713
g	0,541	0,802	9,399	193	0,000	0,675
h	0,698	0,814	11,884	191	0,000	0,858
i	0,767	0,812	13,124	192	0,000	0,945
j	0,788	0,751	14,569	192	0,000	1,049
k	0,747	0,866	12,026	193	0,000	0,863
l	0,565	0,757	10,321	190	0,000	0,747
m	0,632	0,819	10,719	192	0,000	0,772
n	0,588	0,818	10,011	193	0,000	0,719

0,645

over 20 years

	Post >=20 Years	Standard deviation	T	df	Zweiseitiges p	>= 20 Years
a	0,333	0,522	4,282	44	0,000	0,638
b	0,413	0,498	5,627	45	0,000	0,830
c	0,304	0,465	4,437	45	0,000	0,654
d	0,222	0,420	3,546	44	0,001	0,529
e	0,591	0,622	6,302	43	0,000	0,950
f	0,333	0,522	4,282	44	0,000	0,638
g	0,326	0,634	3,486	45	0,001	0,514
h	0,435	0,544	5,423	45	0,000	0,800
i	0,717	0,750	6,486	45	0,000	0,956
j	0,705	0,668	7,001	43	0,000	1,055
k	0,413	0,580	4,828	45	0,000	0,712
l	0,391	0,614	4,323	45	0,000	0,637
m	0,522	0,691	5,122	45	0,000	0,755
n	0,239	0,480	3,379	45	0,002	0,498

0,425



Comparison of the Intervention Impact in Relation to Age
Change in Competencies
cohens d
Competencies
a
b
c
d
e
f
g
h
i
j
k
l
m
n
Δ Pre & Post <20 Years
Δ Pre & Post >=20 Years
cohens d <20 Years
cohens d >= 20 Years

Ohne Abschluss

	Post no degree	Standard deviation	T	df	Zweiseitiges p	cohens d no degree
a	0,625	0,841	5,148	47	0,000	0,743
b	0,864	0,878	6,521	43	0,000	0,983
c	0,577	0,871	4,776	51	0,000	0,662
d	0,569	0,831	4,888	50	0,000	0,684
e	0,774	0,724	7,775	52	0,000	1,068
f	0,588	0,804	5,222	50	0,000	0,731
g	0,509	0,775	4,784	52	0,000	0,657
h	0,725	0,827	6,268	50	0,000	0,878
i	0,660	0,854	5,632	52	0,000	0,774
j	0,784	0,673	8,326	50	0,000	1,166
k	0,717	1,063	4,911	52	0,000	0,675
l	0,686	0,761	6,437	50	0,000	0,901
m	0,580	0,950	4,319	49	0,000	0,611
n	0,588	0,779	5,392	50	0,000	0,755

0,661

Hauptschulabschluss

	Post High School	Standard deviation	T	df	Zweiseitiges p	High School
a	0,727	0,775	7,619	65	0,000	0,938
b	0,776	0,670	9,480	66	0,000	1,158
c	0,701	0,697	8,242	66	0,000	1,007
d	0,652	0,794	6,666	65	0,000	0,820
e	0,785	0,820	7,719	64	0,000	0,957
f	0,612	0,717	6,988	66	0,000	0,854
g	0,712	0,855	6,765	65	0,000	0,833
h	0,754	0,811	7,497	64	0,000	0,930
i	0,864	0,857	8,184	65	0,000	1,007
j	0,776	0,735	8,645	66	0,000	1,056
k	0,788	0,869	7,370	65	0,000	0,907
l	0,682	0,807	6,865	65	0,000	0,845
m	0,657	0,808	6,652	66	0,000	0,813
n	0,687	0,908	6,189	66	0,000	0,756

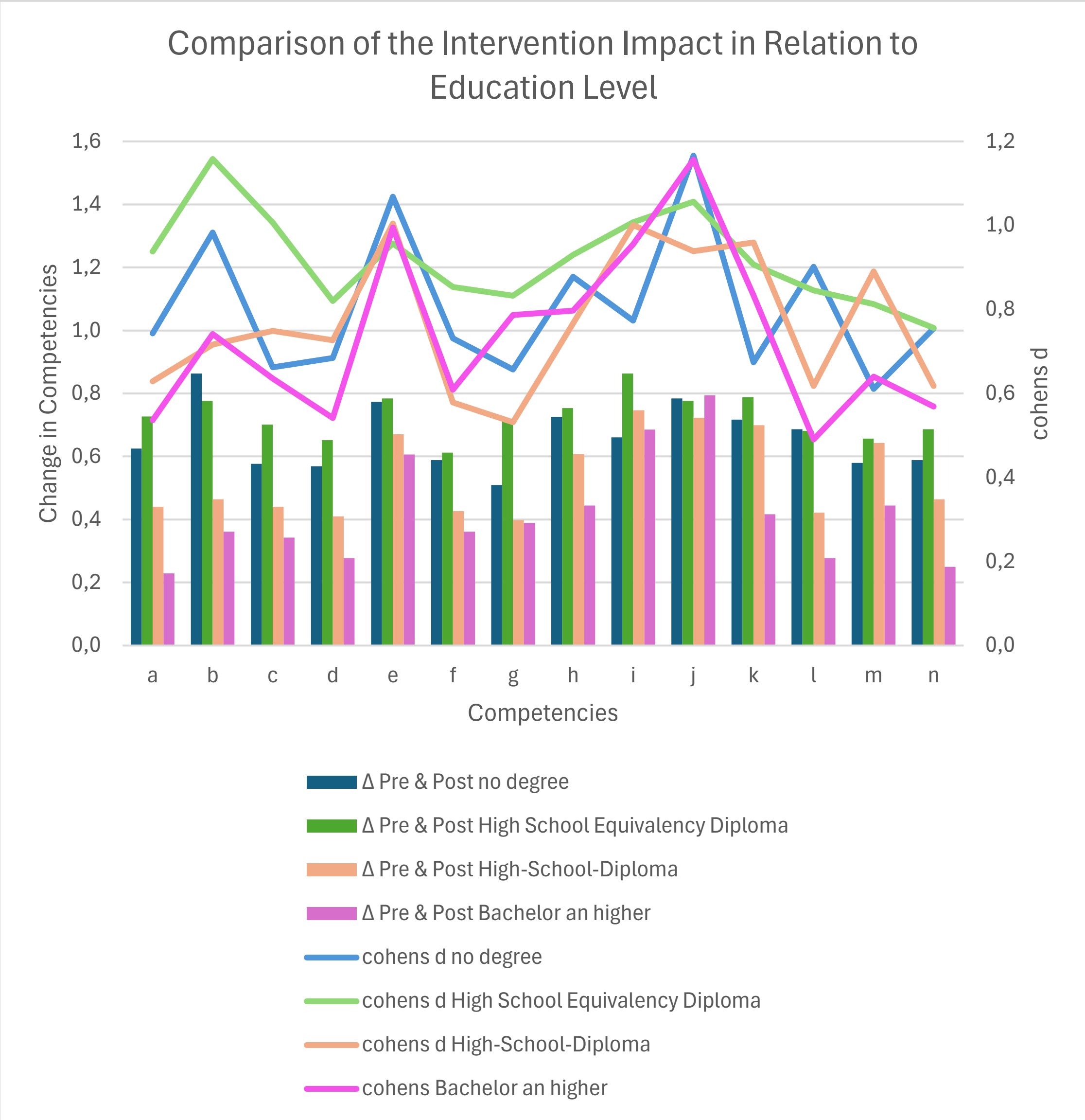
0,727

mittlere Reife

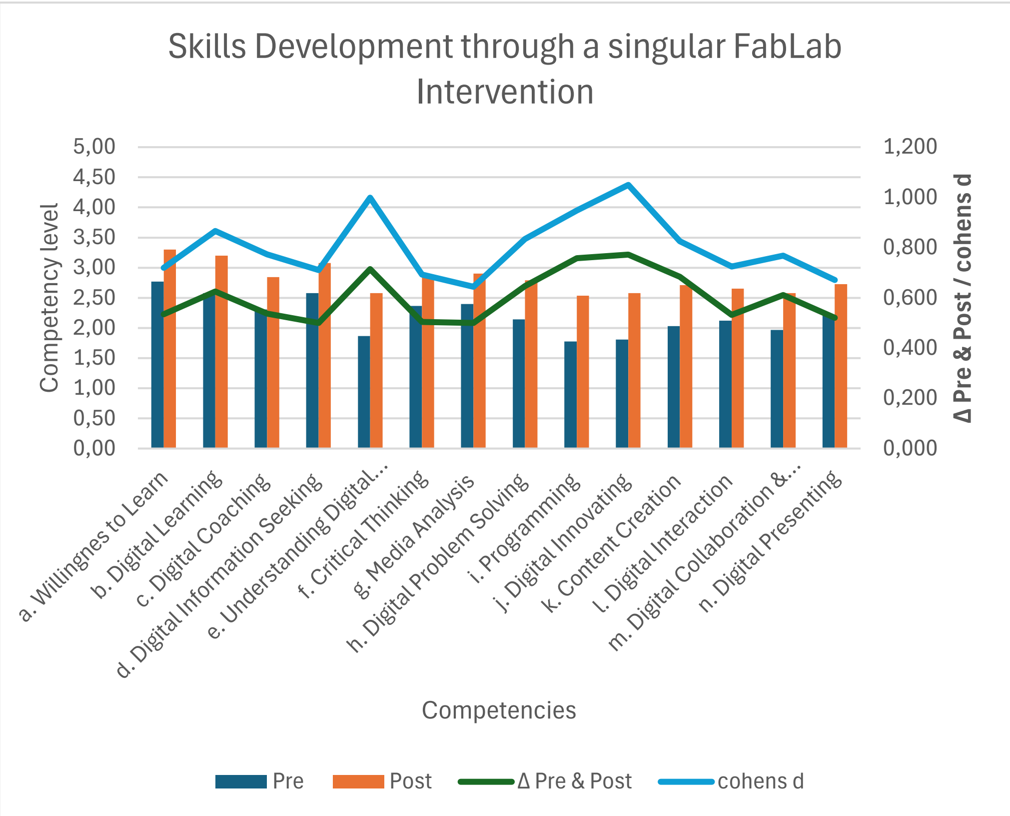
	Post High-School-	Standard deviation	T	df	Zweiseitiges p	cohens d High-School-Diploma
a	0,440	0,700	5,765	83	0,000	0,629
b	0,464	0,648	6,563	83	0,000	0,716
c	0,440	0,588	6,865	83	0,000	0,749
d	0,410	0,564	6,618	82	0,000	0,726
e	0,671	0,668	9,097	81	0,000	1,005
f	0,427	0,738	5,241	81	0,000	0,579
g	0,398	0,748	4,843	82	0,000	0,532
h	0,607	0,792	7,028	83	0,000	0,767
i	0,747	0,746	9,117	82	0,000	1,001
j	0,723	0,770	8,552	82	0,000	0,939
k	0,699	0,728	8,744	82	0,000	0,960
l	0,422	0,683	5,626	82	0,000	0,617
m	0,643	0,722	8,159	83	0,000	0,890
n	0,464	0,752	5,661	83	0,000	0,618
	0,540					

Abitur und höhe

	Post Bachelor	Standard deviation	T	df	Zweiseitiges p	Bachelor an higher
a	0,229	0,426	3,174	34	0,003	0,536
b	0,361	0,487	4,448	35	0,000	0,741
c	0,343	0,539	3,762	34	0,001	0,636
d	0,278	0,513	3,247	35	0,003	0,541
e	0,606	0,609	5,714	32	0,000	0,995
f	0,361	0,593	3,654	35	0,001	0,609
g	0,389	0,494	4,719	35	0,000	0,787
h	0,444	0,558	4,781	35	0,000	0,797
i	0,686	0,718	5,648	34	0,000	0,955
j	0,794	0,687	6,744	33	0,000	1,157
k	0,417	0,500	5,000	35	0,000	0,833
l	0,278	0,566	2,943	35	0,006	0,491
m	0,444	0,695	3,839	35	0,000	0,640
n	0,250	0,439	3,416	35	0,002	0,569
	0,420					


Comparison of the Intervention Impact in Relation to Education Level
Change in Competencies
cohens d
1,6
1,4
1,2
1,0
0,8
0,6
0,4
0,2
0,0
a
b
c
d
e
f
g
h
i
j
k
l
m
n
Competencies
Δ Pre & Post no degree
Δ Pre & Post High School Equivalency Diploma
Δ Pre & Post High-School-Diploma
Δ Pre & Post Bachelor an higher
cohens d no degree
cohens d High School Equivalency Diploma
cohens d High-School-Diploma
cohens Bachelor an higher

	Pre	Standard deviation	Post	Standard deviation	Δ Pre & Post	Standard deviation	cohens d
a. Willingnes	2,77	1,059	3,30	0,925	0,534	0,742	0,720
b. Digital Lea	2,58	1,082	3,20	0,966	0,625	0,722	0,866
c. Digital Coa	2,31	1,069	2,85	0,992	0,538	0,696	0,773
d. Digital Info	2,58	1,166	3,08	1,009	0,500	0,704	0,710
e. Understanc	1,86	0,942	2,58	0,994	0,715	0,716	0,999
f. Critical Thi	2,37	1,078	2,87	1,057	0,504	0,728	0,693
g. Media Ana	2,40	1,062	2,90	1,038	0,500	0,776	0,644
h. Digital Pro	2,14	1,009	2,79	0,997	0,647	0,775	0,835
i. Programmi	1,78	1,019	2,54	1,064	0,757	0,799	0,948
j. Digital Innc	1,81	0,932	2,58	1,029	0,772	0,736	1,050
k. Content Cr	2,03	1,033	2,71	1,045	0,683	0,828	0,825
l. Digital Inte	2,12	0,990	2,65	0,986	0,532	0,734	0,725
m. Digital Cc	1,97	0,970	2,58	1,066	0,611	0,796	0,767
n. Digital Pre	2,20	1,008	2,73	0,993	0,521	0,776	0,671



t-Test

Hinweise

Ausgabe erstellt		05-MAR-2024 00:27:40
Kommentare		
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	Aktiver Datensatz	DataSet1
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	Gewichtu	<keine>
	Aufgeteilte Datei	<keine>
	Anzahl der Zeilen in der Arbeitsdat	242
Behandlung fehlender Werte	Definition für "fehlend"	Benutzerdefinierte fehlende Werte werden als fehlend behandelt.
	Verwendete Fälle	Die Statistiken für jede Analyse basieren auf den Fällen, die für keine der Variablen fehlende Daten oder Daten außerhalb des Bereichs für die Gruppenvariable aufweisen.
Syntax		T-TEST PAIRS=a_post b_post c_post d_post e_post f_post g_post h_post i_post j_post k_post l_post m_post n_post WITH a_pre b_pre c_pre d_pre e_pre f_pre g_pre h_pre i_pre j_pre k_pre l_pre m_pre n_pre (PAIRED) /ES DISPLAY(TRUE) STANDARDIZER(SD)
Ressourcen	Prozessor	00:00:00,00
	Verstriche	00:00:00,01

Statistik bei gepaarten Stichproben

		Mittelwert	N	Std.-Abweichung	Standardfehler des Mittelwertes
Paaren 1	a_post	3,30	234	0,925	0,060
	a_pre	2,77	234	1,059	0,069
Paaren 2	b_post	3,20	232	0,966	0,063
	b_pre	2,58	232	1,082	0,071
Paaren 3	c_post	2,85	240	0,992	0,064
	c_pre	2,31	240	1,069	0,069
Paaren 4	d_post	3,08	238	1,009	0,065
	d_pre	2,58	238	1,166	0,076
Paaren 5	e_post	2,58	235	0,994	0,065
	e_pre	1,86	235	0,942	0,061
Paaren 6	f_post	2,87	238	1,057	0,069
	f_pre	2,37	238	1,078	0,070
Paaren 7	g_post	2,90	240	1,038	0,067
	g_pre	2,40	240	1,062	0,069
Paaren 8	h_post	2,79	238	0,997	0,065
	h_pre	2,14	238	1,009	0,065
Paaren 9	i_post	2,54	239	1,064	0,069
	i_pre	1,78	239	1,019	0,066
Paaren 10	j_post	2,58	237	1,029	0,067
	j_pre	1,81	237	0,932	0,061
Paaren 11	k_post	2,71	240	1,045	0,067
	k_pre	2,03	240	1,033	0,067
Paaren 12	l_post	2,65	237	0,986	0,064
	l_pre	2,12	237	0,990	0,064
Paaren 13	m_post	2,58	239	1,066	0,069
	m_pre	1,97	239	0,970	0,063
Paaren 14	n_post	2,73	240	0,993	0,064
	n_pre	2,20	240	1,008	0,065

Korrelationen bei gepaarten Stichproben

		N	Korrelation	Signifikanz	
				s p	es p
Paaren 1	a_post &	234	0,728	0,000	0,000
Paaren 2	b_post &	232	0,757	0,000	0,000
Paaren 3	c_post &	240	0,775	0,000	0,000
Paaren 4	d_post &	238	0,800	0,000	0,000
Paaren 5	e_post &	235	0,728	0,000	0,000
Paaren 6	f_post &	238	0,768	0,000	0,000
Paaren 7	g_post &	240	0,727	0,000	0,000
Paaren 8	h_post &	238	0,701	0,000	0,000
Paaren 9	i_post &	239	0,707	0,000	0,000
Paaren 10	j_post &	237	0,723	0,000	0,000
Paaren 11	k_post &	240	0,682	0,000	0,000
Paaren 12	l_post &	237	0,725	0,000	0,000
Paaren 13	m_post &	239	0,698	0,000	0,000
Paaren 14	n_post &	240	0,700	0,000	0,000

Test bei gepaarten Stichproben

		Gepaarte Differenzen					
					95% Konfidenzintervall der Differenz		
		Mittelwert	Std.-Abweichung	Standardfehler des Mittelwertes	Unterer Wert	Oberer Wert	T
Paaren 1	a_post -	0,534	0,742	0,048	0,439	0,630	11,015
Paaren 2	b_post -	0,625	0,722	0,047	0,532	0,718	13,187
Paaren 3	c_post -	0,538	0,696	0,045	0,449	0,626	11,970
Paaren 4	d_post -	0,500	0,704	0,046	0,410	0,590	10,955
Paaren 5	e_post -	0,715	0,716	0,047	0,623	0,807	15,310
Paaren 6	f_post -	0,504	0,728	0,047	0,411	0,597	10,689
Paaren 7	g_post -	0,500	0,776	0,050	0,401	0,599	9,979
Paaren 8	h_post -	0,647	0,775	0,050	0,548	0,746	12,880
Paaren 9	i_post -	0,757	0,799	0,052	0,656	0,859	14,654
Paaren 10	j_post -	0,772	0,736	0,048	0,678	0,866	16,160
Paaren 11	k_post -	0,683	0,828	0,053	0,578	0,789	12,782
Paaren 12	l_post -	0,532	0,734	0,048	0,438	0,626	11,157
Paaren 13	m_post -	0,611	0,796	0,051	0,509	0,712	11,864
Paaren 14	n_post -	0,521	0,776	0,050	0,422	0,620	10,399

df	Signifikanz: Einseitiges p	Signifikanz: Zweiseitiges p
233	0,000	0,000
231	0,000	0,000
239	0,000	0,000
237	0,000	0,000
234	0,000	0,000
237	0,000	0,000
239	0,000	0,000
237	0,000	0,000
238	0,000	0,000
236	0,000	0,000
239	0,000	0,000
236	0,000	0,000
238	0,000	0,000
239	0,000	0,000

Effektgrößen bei Stichproben mit paarigen Werten

			Standardisierer[a]	Punktschätzung	Konfidenzintervall	
					Wert	Wert
Paaren 1	a_post - a_pre	Cohen's d	0,742	0,720	0,576	0,863
		Hedges'	0,744	0,718	0,574	0,861
Paaren 2	b_post - b_pre	Cohen's d	0,722	0,866	0,714	1,016
		Hedges'	0,724	0,863	0,712	1,013
Paaren 3	c_post - c_pre	Cohen's d	0,696	0,773	0,628	0,916
		Hedges'	0,698	0,770	0,626	0,913
Paaren 4	d_post - d_pre	Cohen's d	0,704	0,710	0,567	0,852
		Hedges'	0,706	0,708	0,565	0,849
Paaren 5	e_post - e_pre	Cohen's d	0,716	0,999	0,841	1,155
		Hedges'	0,718	0,996	0,839	1,151
Paaren 6	f_post - f_pre	Cohen's d	0,728	0,693	0,551	0,834
		Hedges'	0,730	0,691	0,549	0,831
Paaren 7	g_post - g_pre	Cohen's d	0,776	0,644	0,505	0,783
		Hedges'	0,779	0,642	0,503	0,780
Paaren 8	h_post - h_pre	Cohen's d	0,775	0,835	0,687	0,982
		Hedges'	0,777	0,832	0,684	0,979
Paaren 9	i_post - i_pre	Cohen's d	0,799	0,948	0,794	1,100
		Hedges'	0,801	0,945	0,792	1,096
Paaren 10	j_post - j_pre	Cohen's d	0,736	1,050	0,890	1,208
		Hedges'	0,738	1,046	0,888	1,204
Paaren 11	k_post - k_pre	Cohen's d	0,828	0,825	0,678	0,971
		Hedges'	0,831	0,822	0,676	0,968
Paaren 12	l_post - l_pre	Cohen's d	0,734	0,725	0,581	0,867
		Hedges'	0,736	0,722	0,579	0,864
Paaren 13	m_post - m_pre	Cohen's d	0,796	0,767	0,622	0,911
		Hedges'	0,799	0,765	0,621	0,908
Paaren 14	n_post - n_pre	Cohen's d	0,776	0,671	0,531	0,811
		Hedges'	0,778	0,669	0,529	0,808

a. Der bei der Schätzung der Effektgrößen verwendete Nenner.
Cohen's d verwendet die Standardabweichung einer Stichprobe der Mittelwertdifferenz.
Hedges' Korrektur verwendet die Standardabweichung einer Stichprobe der Mittelwertdifferenz und einen Korrekturfaktor.

t-Test

Hinweise

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Kommentare		
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	Filter	Experienc
	Gewichtu	<keine>
	Aufgeteilt	<keine>
	Anzahl der Zeilen in der	215
Behandlung fehlender Werte	Definition für "fehlend"	Benutzerdefinierte fehlende Werte
	Verwendete Fälle	Die Statistiken für jede Analyse basieren auf den Fällen, die für keine der Variablen

Syntax		T-TEST PAIRS=a _post b_post c_post d_post e_post f_post g_post h_post i_post j_post k_post l_post m_post n_post WITH a_pre
Ressourcen	Prozessor	0:00:00,00
	Verstriche	0:00:00,01

Statistik bei gepaarten Stichproben

		Mittelwert	N	Std.-Abweichung	Standardfehler des Mittelwertes
Paaren 1	a_post	3,27	208	0,925	0,064
	a_pre	2,71	208	1,065	0,074
Paaren 2	b_post	3,15	206	0,958	0,067
	b_pre	2,50	206	1,072	0,075
Paaren 3	c_post	2,81	214	1,000	0,068
	c_pre	2,25	214	1,070	0,073
Paaren 4	d_post	3,02	211	1,005	0,069
	d_pre	2,51	211	1,152	0,079
Paaren 5	e_post	2,50	208	0,973	0,067
	e_pre	1,75	208	0,882	0,061
Paaren 6	f_post	2,83	211	1,069	0,074
	f_pre	2,32	211	1,077	0,074
Paaren 7	g_post	2,87	213	1,033	0,071
	g_pre	2,33	213	1,048	0,072
Paaren 8	h_post	2,73	211	0,984	0,068
	h_pre	2,08	211	0,983	0,068
Paaren 9	i_post	2,44	212	1,008	0,069
	i_pre	1,65	212	0,924	0,063
Paaren 10	j_post	2,50	210	1,013	0,070
	j_pre	1,70	210	0,869	0,060
Paaren 11	k_post	2,66	213	1,009	0,069
	k_pre	1,93	213	0,993	0,068
Paaren 12	l_post	2,60	210	0,993	0,069
	l_pre	2,05	210	0,977	0,067
Paaren 13	m_post	2,50	212	1,009	0,069
	m_pre	1,87	212	0,914	0,063
Paaren 14	n_post	2,68	213	0,987	0,068
	n_pre	2,13	213	0,991	0,068

Korrelationen bei gepaarten Stichproben

		N	Korrelation	Signifikanz s p	Signifikanz es p
Paaren 1	a_post &	208	0,722	0,000	0,000
Paaren 2	b_post &	206	0,744	0,000	0,000
Paaren 3	c_post &	214	0,768	0,000	0,000
Paaren 4	d_post &	211	0,786	0,000	0,000
Paaren 5	e_post &	208	0,708	0,000	0,000
Paaren 6	f_post &	211	0,771	0,000	0,000
Paaren 7	g_post &	213	0,746	0,000	0,000
Paaren 8	h_post &	211	0,676	0,000	0,000
Paaren 9	i_post &	212	0,656	0,000	0,000
Paaren 10	j_post &	210	0,723	0,000	0,000
Paaren 11	k_post &	213	0,679	0,000	0,000
Paaren 12	l_post &	210	0,715	0,000	0,000
Paaren 13	m_post &	212	0,683	0,000	0,000
Paaren 14	n_post &	213	0,699	0,000	0,000

Test bei gepaarten Stichproben

		Gepaarte Differenzen					
					Konfidenzintervall der Differenz		
		Mittelwert	Std.-Abweichung	Standardfehler des Mittelwertes	Unterer Wert	Oberer Wert	T
Paaren 1	a_post -	0,558	0,753	0,052	0,455	0,661	10,684
Paaren 2	b_post -	0,655	0,734	0,051	0,554	0,756	12,810
Paaren 3	c_post -	0,561	0,708	0,048	0,465	0,656	11,589
Paaren 4	d_post -	0,512	0,720	0,050	0,414	0,609	10,333
Paaren 5	e_post -	0,745	0,714	0,049	0,648	0,843	15,055
Paaren 6	f_post -	0,512	0,726	0,050	0,413	0,610	10,239
Paaren 7	g_post -	0,540	0,743	0,051	0,440	0,640	10,611
Paaren 8	h_post -	0,659	0,791	0,054	0,551	0,766	12,096
Paaren 9	i_post -	0,792	0,805	0,055	0,683	0,901	14,326
Paaren 10	j_post -	0,795	0,713	0,049	0,698	0,892	16,167
Paaren 11	k_post -	0,728	0,802	0,055	0,619	0,836	13,250
Paaren 12	l_post -	0,557	0,744	0,051	0,456	0,658	10,846
Paaren 13	m_post -	0,632	0,771	0,053	0,528	0,736	11,943
Paaren 14	n_post -	0,545	0,767	0,053	0,441	0,648	10,358

	Signifikanz	
df	Einseitiges p	Zweiseitiges p
207	0,000	0,000
205	0,000	0,000
213	0,000	0,000
210	0,000	0,000
207	0,000	0,000
210	0,000	0,000
212	0,000	0,000
210	0,000	0,000
211	0,000	0,000
209	0,000	0,000
212	0,000	0,000
209	0,000	0,000
211	0,000	0,000
212	0,000	0,000

Effektgrößen bei Stichproben mit paarigen Werten

			Standardisierer[a]	Punktschätzung	95% Konfidenzintervall Unterer Wert	Oberer Wert
Paaren 1	a_post -	Cohen's d	0,753	0,741	0,587	0,894
Paaren 2	b_post -	Cohen's d	0,734	0,892	0,730	1,053
Paaren 3	c_post -	Cohen's d	0,708	0,792	0,638	0,945
Paaren 4	d_post -	Cohen's d	0,720	0,711	0,560	0,862
Paaren 5	e_post -	Cohen's d	0,714	1,044	0,874	1,212
Paaren 6	f_post -	Cohen's d	0,726	0,705	0,553	0,855
Paaren 7	g_post -	Cohen's d	0,743	0,727	0,575	0,877
Paaren 8	h_post -	Cohen's d	0,791	0,833	0,675	0,989
Paaren 9	i_post -	Cohen's d	0,805	0,984	0,819	1,147
Paaren 10	j_post -	Cohen's d	0,713	1,116	0,942	1,287
Paaren 11	k_post -	Cohen's d	0,802	0,908	0,747	1,067
Paaren 12	l_post -	Cohen's d	0,744	0,748	0,595	0,901
Paaren 13	m_post -	Cohen's d	0,771	0,820	0,664	0,975
Paaren 14	n_post -	Cohen's d	0,767	0,710	0,559	0,859

a. Der bei der Schätzung der Effektgrößen verwendete Nenner.
Cohen's d verwendet die Standardabweichung einer Stichprobe der Mittelwertdifferenz.
Hedges' Korrektur verwendet die Standardabweichung einer Stichprobe der Mittelwertdifferenz und einen Korrekturfaktor.

t-Test

Hinweise

Ausgabe erstellt		4 01:01:41
Kommentare		
Eingabe	Daten	C:\Users\lukas\OneDrive - Hochschule Ruhr West\Dokumente\HRW-WMA\Promotion\Publicatione
	Aktiver Datenset	DataSet1
	Filter	Experienc
	Gewichtu	<keine>
	Aufgeteilt	<keine>
	Anzahl der Zeilen in der	25
Behandlung fehlender Werte	Definition für "fehlend"	Benutzerdefinierte fehlende Werte
	Verwendete Fälle	Die Statistiken für jede Analyse basieren auf den Fällen, die für keine der Variablen

Syntax		T-TEST PAIRS=a_post b_post c_post d_post e_post f_post g_post h_post i_post j_post k_post l_post m_post n_post WITH a_pre
Ressourcen	Prozessor	0:00:00,00
	Verstriche	0:00:00,01

Statistik bei gepaarten Stichproben

		Mittelwert	N	Std.-Abweichung	Standardfehler des Mittelwertes
Paaren 1	a_post	3,67	24	0,868	0,177
	a_pre	3,29	24	0,908	0,185
Paaren 2	b_post	3,71	24	0,908	0,185
	b_pre	3,29	24	0,955	0,195
Paaren 3	c_post	3,16	25	0,898	0,180
	c_pre	2,84	25	0,943	0,189
Paaren 4	d_post	3,64	25	0,907	0,181
	d_pre	3,24	25	1,091	0,218
Paaren 5	e_post	3,32	25	0,852	0,170
	e_pre	2,76	25	0,970	0,194
Paaren 6	f_post	3,24	25	0,926	0,185
	f_pre	2,84	25	0,987	0,197
Paaren 7	g_post	3,28	25	0,980	0,196
	g_pre	2,96	25	1,060	0,212
Paaren 8	h_post	3,28	25	1,021	0,204
	h_pre	2,72	25	1,100	0,220
Paaren 9	i_post	3,40	25	1,155	0,231
	i_pre	2,88	25	1,166	0,233
Paaren 10	j_post	3,24	25	0,970	0,194
	j_pre	2,60	25	1,080	0,216
Paaren 11	k_post	3,28	25	1,137	0,227
	k_pre	2,76	25	1,091	0,218
Paaren 12	l_post	3,12	25	0,833	0,167
	l_pre	2,76	25	0,926	0,185
Paaren 13	m_post	3,36	25	1,186	0,237
	m_pre	2,76	25	1,091	0,218
Paaren 14	n_post	3,20	25	0,957	0,191
	n_pre	2,80	25	1,000	0,200

Korrelationen bei gepaarten Stichproben

		N	Korrelation	Signifikanz	
				s p	es p
Paaren 1	a_post &	24	0,736	0,000	0,000
Paaren 2	b_post &	24	0,805	0,000	0,000
Paaren 3	c_post &	25	0,818	0,000	0,000
Paaren 4	d_post &	25	0,849	0,000	0,000
Paaren 5	e_post &	25	0,752	0,000	0,000
Paaren 6	f_post &	25	0,683	0,000	0,000
Paaren 7	g_post &	25	0,653	0,000	0,000
Paaren 8	h_post &	25	0,814	0,000	0,000
Paaren 9	i_post &	25	0,842	0,000	0,000
Paaren 10	j_post &	25	0,653	0,000	0,000
Paaren 11	k_post &	25	0,795	0,000	0,000
Paaren 12	l_post &	25	0,742	0,000	0,000
Paaren 13	m_post &	25	0,746	0,000	0,000
Paaren 14	n_post &	25	0,653	0,000	0,000

Test bei gepaarten Stichproben

		Gepaarte Differenzen					T
		Mittelwert	Std.-Abweichung	Standardfehler des Mittelwertes	95% Konfidenzintervall der Differenz		
					Unterer Wert	Oberer Wert	
Paaren 1	a_post -	0,375	0,647	0,132	0,102	0,648	2,840
Paaren 2	b_post -	0,417	0,584	0,119	0,170	0,663	3,498
Paaren 3	c_post -	0,320	0,557	0,111	0,090	0,550	2,874
Paaren 4	d_post -	0,400	0,577	0,115	0,162	0,638	3,464
Paaren 5	e_post -	0,560	0,651	0,130	0,291	0,829	4,303
Paaren 6	f_post -	0,400	0,764	0,153	0,085	0,715	2,619
Paaren 7	g_post -	0,320	0,852	0,170	-0,032	0,672	1,877
Paaren 8	h_post -	0,560	0,651	0,130	0,291	0,829	4,303
Paaren 9	i_post -	0,520	0,653	0,131	0,250	0,790	3,980
Paaren 10	j_post -	0,640	0,860	0,172	0,285	0,995	3,720
Paaren 11	k_post -	0,520	0,714	0,143	0,225	0,815	3,641
Paaren 12	l_post -	0,360	0,638	0,128	0,097	0,623	2,823
Paaren 13	m_post -	0,600	0,816	0,163	0,263	0,937	3,674
Paaren 14	n_post -	0,400	0,816	0,163	0,063	0,737	2,449

	Signifikanz	
df	Einseitiges p	Zweiseitiges p
23	0,005	0,009
23	0,001	0,002
24	0,004	0,008
24	0,001	0,002
24	0,000	0,000
24	0,008	0,015
24	0,036	0,073
24	0,000	0,000
24	0,000	0,001
24	0,001	0,001
24	0,001	0,001
24	0,005	0,009
24	0,001	0,001
24	0,011	0,022

Effektgrößen bei Stichproben mit paarigen Werten

			Standardisierer[a]	Punktschätzung	Konfidenzintervall	
					Wert	Wert
Paaren 1	a_post -	Cohen's d	0,647	0,580	0,141	1,008
Paaren 2	b_post -	Cohen's d	0,584	0,714	0,258	1,157
Paaren 3	c_post -	Cohen's d	0,557	0,575	0,146	0,994
Paaren 4	d_post -	Cohen's d	0,577	0,693	0,249	1,125
Paaren 5	e_post -	Cohen's d	0,651	0,861	0,393	1,315
Paaren 6	f_post -	Cohen's d	0,764	0,524	0,100	0,938
Paaren 7	g_post -	Cohen's d	0,852	0,375	-0,034	0,778
Paaren 8	h_post -	Cohen's d	0,651	0,861	0,393	1,315
Paaren 9	i_post -	Cohen's d	0,653	0,796	0,338	1,241
Paaren 10	j_post -	Cohen's d	0,860	0,744	0,294	1,182
Paaren 11	k_post -	Cohen's d	0,714	0,728	0,280	1,164
Paaren 12	l_post -	Cohen's d	0,638	0,565	0,137	0,982
Paaren 13	m_post -	Cohen's d	0,816	0,735	0,286	1,172
Paaren 14	n_post -	Cohen's d	0,816	0,490	0,070	0,901

a. Der bei der Schätzung der Effektgrößen verwendete Nenner.
Cohen's d verwendet die Standardabweichung einer Stichprobe der Mittelwertdifferenz.
Hedges' Korrektur verwendet die Standardabweichung einer Stichprobe der Mittelwertdifferenz und einen Korrekturfaktor.

t-Test

Hinweise

Ausgabe erstellt		4 01:04:18
Kommentare		
Eingabe	Daten	C:\Users\lukas\OneDrive - Hochschule Ruhr West\Dokumente\HRW-WMA\Promotion\Publicatione
	Aktiver	DataSet1
	Filter	Age <= 1
	Gewichtu	<keine>
	Aufgeteilt	<keine>
	Anzahl der Zeilen	196
Behandlung fehlender Werte	Definition für "fehlend"	Benutzerdefinierte fehlende Werte
	Verwendete Fälle	Die Statistiken für jede Analyse basieren auf den Fällen, die für keine der Variablen

Syntax		T-TEST PAIRS=a _post b_post c_post d_post e_post f_post g_post h_post i_post j_post k_post l_post m_post n_post WITH a_pre
Ressourcen	Prozessor	0:00:00,02
	Verstriche	0:00:00,01

Statistik bei gepaarten Stichproben

		Mittelwert	N	Std.-Abweichung	Standardfehler des Mittelwertes
Paaren 1	a_post	3,21	189	0,920	0,067
	a_pre	2,62	189	1,027	0,075
Paaren 2	b_post	3,13	186	0,963	0,071
	b_pre	2,46	186	1,056	0,077
Paaren 3	c_post	2,79	194	0,992	0,071
	c_pre	2,20	194	1,041	0,075
Paaren 4	d_post	2,98	193	0,971	0,070
	d_pre	2,42	193	1,106	0,080
Paaren 5	e_post	2,55	191	0,982	0,071
	e_pre	1,81	191	0,906	0,066
Paaren 6	f_post	2,79	193	1,047	0,075
	f_pre	2,24	193	1,040	0,075
Paaren 7	g_post	2,86	194	1,013	0,073
	g_pre	2,31	194	1,023	0,073
Paaren 8	h_post	2,73	192	0,991	0,071
	h_pre	2,04	192	0,962	0,069
Paaren 9	i_post	2,48	193	1,061	0,076
	i_pre	1,72	193	0,972	0,070
Paaren 10	j_post	2,54	193	1,030	0,074
	j_pre	1,76	193	0,888	0,064
Paaren 11	k_post	2,68	194	1,049	0,075
	k_pre	1,93	194	0,979	0,070
Paaren 12	l_post	2,59	191	0,995	0,072
	l_pre	2,03	191	0,965	0,070
Paaren 13	m_post	2,51	193	1,066	0,077
	m_pre	1,88	193	0,914	0,066
Paaren 14	n_post	2,68	194	1,009	0,072
	n_pre	2,09	194	0,986	0,071

Korrelationen bei gepaarten Stichproben

		N	Korrelation	Signifikanz	
				s p	es p
Paaren 1	a_post &	189	0,685	0,000	0,000
Paaren 2	b_post &	186	0,721	0,000	0,000
Paaren 3	c_post &	194	0,743	0,000	0,000
Paaren 4	d_post &	193	0,753	0,000	0,000
Paaren 5	e_post &	191	0,700	0,000	0,000
Paaren 6	f_post &	193	0,732	0,000	0,000
Paaren 7	g_post &	194	0,689	0,000	0,000
Paaren 8	h_post &	192	0,653	0,000	0,000
Paaren 9	i_post &	193	0,684	0,000	0,000
Paaren 10	j_post &	193	0,703	0,000	0,000
Paaren 11	k_post &	194	0,638	0,000	0,000
Paaren 12	l_post &	191	0,702	0,000	0,000
Paaren 13	m_post &	193	0,667	0,000	0,000
Paaren 14	n_post &	194	0,664	0,000	0,000

Test bei gepaarten Stichproben

		Gepaarte Differenzen					T
					95% Konfidenzintervall der Differenz		
		Mittelwert	Std.-Abweichung	Standardfehler des Mittelwertes	Unterer Wert	Oberer Wert	
Paaren 1	a_post -	0,582	0,779	0,057	0,470	0,694	10,276
Paaren 2	b_post -	0,677	0,759	0,056	0,568	0,787	12,168
Paaren 3	c_post -	0,593	0,730	0,052	0,489	0,696	11,311
Paaren 4	d_post -	0,565	0,741	0,053	0,460	0,670	10,588
Paaren 5	e_post -	0,743	0,734	0,053	0,639	0,848	13,994
Paaren 6	f_post -	0,544	0,763	0,055	0,436	0,652	9,901
Paaren 7	g_post -	0,541	0,802	0,058	0,428	0,655	9,399
Paaren 8	h_post -	0,698	0,814	0,059	0,582	0,814	11,884
Paaren 9	i_post -	0,767	0,812	0,058	0,652	0,882	13,124
Paaren 10	j_post -	0,788	0,751	0,054	0,681	0,894	14,569
Paaren 11	k_post -	0,747	0,866	0,062	0,625	0,870	12,026
Paaren 12	l_post -	0,565	0,757	0,055	0,457	0,674	10,321
Paaren 13	m_post -	0,632	0,819	0,059	0,516	0,748	10,719
Paaren 14	n_post -	0,588	0,818	0,059	0,472	0,703	10,011

	Signifikanz	
df	Einseitiges p	Zweiseitiges p
188	0,000	0,000
185	0,000	0,000
193	0,000	0,000
192	0,000	0,000
190	0,000	0,000
192	0,000	0,000
193	0,000	0,000
191	0,000	0,000
192	0,000	0,000
192	0,000	0,000
193	0,000	0,000
190	0,000	0,000
192	0,000	0,000
193	0,000	0,000

Effektgrößen bei Stichproben mit paarigen Werten

			Standardisierer[a]	Punktschätzung	Konfidenzintervall Wert	Wert
Paaren 1	a_post -	Cohen's d	0,779	0,747	0,585	0,908
Paaren 2	b_post -	Cohen's d	0,759	0,892	0,721	1,061
Paaren 3	c_post -	Cohen's d	0,730	0,812	0,649	0,974
Paaren 4	d_post -	Cohen's d	0,741	0,762	0,601	0,922
Paaren 5	e_post -	Cohen's d	0,734	1,013	0,837	1,186
Paaren 6	f_post -	Cohen's d	0,763	0,713	0,554	0,870
Paaren 7	g_post -	Cohen's d	0,802	0,675	0,518	0,830
Paaren 8	h_post -	Cohen's d	0,814	0,858	0,691	1,022
Paaren 9	i_post -	Cohen's d	0,812	0,945	0,774	1,114
Paaren 10	j_post -	Cohen's d	0,751	1,049	0,872	1,224
Paaren 11	k_post -	Cohen's d	0,866	0,863	0,698	1,028
Paaren 12	l_post -	Cohen's d	0,757	0,747	0,586	0,906
Paaren 13	m_post -	Cohen's d	0,819	0,772	0,610	0,932
Paaren 14	n_post -	Cohen's d	0,818	0,719	0,560	0,876

a. Der bei der Schätzung der Effektgrößen verwendete Nenner.
Cohen's d verwendet die Standardabweichung einer Stichprobe der Mittelwertdifferenz.
Hedges' Korrektur verwendet die Standardabweichung einer Stichprobe der Mittelwertdifferenz und einen Korrekturfaktor.

t-Test

Hinweise

Ausgabe erstellt		4 01:05:11
Kommentare		
Eingabe	Daten	C:\Users\lukas\OneDrive - Hochschule Ruhr West\Dokumente\HRW-WMA\Promotion\Publicatione
	Aktiver	DataSet1
	Filter	Age > 1
	Gewichtu	<keine>
	Aufgeteilt	<keine>
	Anzahl der Zeilen in der	46
Behandlung fehlender Werte	Definition für "fehlend"	Benutzerdefinierte fehlende Werte
	Verwendete Fälle	Die Statistiken für jede Analyse basieren auf den Fällen, die für keine der Variablen

Syntax		T-TEST PAIRS=a _post b_post c_post d_post e_post f_post g_post h_post i_post j_post k_post l_post m_post n_post WITH a_pre
Ressourcen	Prozessor	0:00:00,00
	Verstriche	0:00:00,01

Statistik bei gepaarten Stichproben

		Mittelwert	N	Std.-Abweichung	Standardfehler des Mittelwertes
Paaren 1	a_post	3,71	45	0,843	0,126
	a_pre	3,38	45	0,984	0,147
Paaren 2	b_post	3,48	46	0,937	0,138
	b_pre	3,07	46	1,063	0,157
Paaren 3	c_post	3,07	46	0,975	0,144
	c_pre	2,76	46	1,079	0,159
Paaren 4	d_post	3,49	45	1,079	0,161
	d_pre	3,27	45	1,176	0,175
Paaren 5	e_post	2,70	44	1,047	0,158
	e_pre	2,11	44	1,061	0,160
Paaren 6	f_post	3,22	45	1,042	0,155
	f_pre	2,89	45	1,092	0,163
Paaren 7	g_post	3,09	46	1,132	0,167
	g_pre	2,76	46	1,158	0,171
Paaren 8	h_post	3,02	46	1,000	0,147
	h_pre	2,59	46	1,087	0,160
Paaren 9	i_post	2,76	46	1,058	0,156
	i_pre	2,04	46	1,173	0,173
Paaren 10	j_post	2,73	44	1,020	0,154
	j_pre	2,02	44	1,089	0,164
Paaren 11	k_post	2,87	46	1,024	0,151
	k_pre	2,46	46	1,149	0,169
Paaren 12	l_post	2,91	46	0,915	0,135
	l_pre	2,52	46	1,005	0,148
Paaren 13	m_post	2,85	46	1,032	0,152
	m_pre	2,33	46	1,117	0,165
Paaren 14	n_post	2,93	46	0,904	0,133
	n_pre	2,70	46	0,963	0,142

Korrelationen bei gepaarten Stichproben

		N	Korrelation	Signifikanz s p	Signifikanz es p
Paaren 1	a_post &	45	0,847	0,000	0,000
Paaren 2	b_post &	46	0,883	0,000	0,000
Paaren 3	c_post &	46	0,902	0,000	0,000
Paaren 4	d_post &	45	0,934	0,000	0,000
Paaren 5	e_post &	44	0,826	0,000	0,000
Paaren 6	f_post &	45	0,881	0,000	0,000
Paaren 7	g_post &	46	0,847	0,000	0,000
Paaren 8	h_post &	46	0,867	0,000	0,000
Paaren 9	i_post &	46	0,779	0,000	0,000
Paaren 10	j_post &	44	0,802	0,000	0,000
Paaren 11	k_post &	46	0,864	0,000	0,000
Paaren 12	l_post &	46	0,800	0,000	0,000
Paaren 13	m_post &	46	0,796	0,000	0,000
Paaren 14	n_post &	46	0,870	0,000	0,000

Test bei gepaarten Stichproben

		Gepaarte Differenzen					
					Konfidenzintervall der Differenz		
		Mittelwert	Std.-Abweichung	Standardfehler des Mittelwertes	Unterer Wert	Oberer Wert	T
Paaren 1	a_post -	0,333	0,522	0,078	0,176	0,490	4,282
Paaren 2	b_post -	0,413	0,498	0,073	0,265	0,561	5,627
Paaren 3	c_post -	0,304	0,465	0,069	0,166	0,442	4,437
Paaren 4	d_post -	0,222	0,420	0,063	0,096	0,349	3,546
Paaren 5	e_post -	0,591	0,622	0,094	0,402	0,780	6,302
Paaren 6	f_post -	0,333	0,522	0,078	0,176	0,490	4,282
Paaren 7	g_post -	0,326	0,634	0,094	0,138	0,514	3,486
Paaren 8	h_post -	0,435	0,544	0,080	0,273	0,596	5,423
Paaren 9	i_post -	0,717	0,750	0,111	0,495	0,940	6,486
Paaren 10	j_post -	0,705	0,668	0,101	0,502	0,907	7,001
Paaren 11	k_post -	0,413	0,580	0,086	0,241	0,585	4,828
Paaren 12	l_post -	0,391	0,614	0,091	0,209	0,574	4,323
Paaren 13	m_post -	0,522	0,691	0,102	0,317	0,727	5,122
Paaren 14	n_post -	0,239	0,480	0,071	0,097	0,382	3,379

	Signifikanz	
df	Einseitiges p	Zweiseitiges p
44	0,000	0,000
45	0,000	0,000
45	0,000	0,000
44	0,000	0,001
43	0,000	0,000
44	0,000	0,000
45	0,001	0,001
45	0,000	0,000
45	0,000	0,000
43	0,000	0,000
45	0,000	0,000
45	0,000	0,000
45	0,000	0,000
45	0,001	0,002

Effektgrößen bei Stichproben mit paarigen Werten

			Standardisierer[a]	Punktschätzung	Konfidenzintervall	
					Wert	Wert
Paaren 1	a_post -	Cohen's d	0,522	0,638	0,314	0,956
Paaren 2	b_post -	Cohen's d	0,498	0,830	0,491	1,162
Paaren 3	c_post -	Cohen's d	0,465	0,654	0,332	0,970
Paaren 4	d_post -	Cohen's d	0,420	0,529	0,214	0,838
Paaren 5	e_post -	Cohen's d	0,622	0,950	0,589	1,303
Paaren 6	f_post -	Cohen's d	0,522	0,638	0,314	0,956
Paaren 7	g_post -	Cohen's d	0,634	0,514	0,204	0,819
Paaren 8	h_post -	Cohen's d	0,544	0,800	0,464	1,129
Paaren 9	i_post -	Cohen's d	0,750	0,956	0,603	1,302
Paaren 10	j_post -	Cohen's d	0,668	1,055	0,682	1,421
Paaren 11	k_post -	Cohen's d	0,580	0,712	0,385	1,033
Paaren 12	l_post -	Cohen's d	0,614	0,637	0,317	0,952
Paaren 13	m_post -	Cohen's d	0,691	0,755	0,424	1,080
Paaren 14	n_post -	Cohen's d	0,480	0,498	0,189	0,802

a. Der bei der Schätzung der Effektgrößen verwendete Nenner.
Cohen's d verwendet die Standardabweichung einer Stichprobe der Mittelwertdifferenz.
Hedges' Korrektur verwendet die Standardabweichung einer Stichprobe der Mittelwertdifferenz und einen Korrekturfaktor.

t-Test

Hinweise

Ausgabe erstellt		4 01:06:01
Kommentare		
Eingabe	Daten	C:\Users\lukas\OneDrive - Hochschule Ruhr West\Dokumente\HRW-WMA\Promotion\Publicatione
	Aktiver	DataSet1
	Filter	Education
	Gewichtu	<keine>
	Aufgeteilt	<keine>
	Anzahl der Zeilen in der	53
Behandlung fehlender Werte	Definition für "fehlend"	Benutzerdefinierte fehlende Werte
	Verwendete Fälle	Die Statistiken für jede Analyse basieren auf den Fällen, die für keine der Variablen

Syntax		T-TEST PAIRS=a _post b_post c_post d_post e_post f_post g_post h_post i_post j_post k_post l_post m_post n_post WITH a_pre
Ressourcen	Prozessor	0:00:00,02
	Verstriche	0:00:00,01

Statistik bei gepaarten Stichproben

		Mittelwert	N	Std.-Abweichung	Standardfehler des Mittelwertes
Paaren 1	a_post	2,96	48	0,898	0,130
	a_pre	2,33	48	1,059	0,153
Paaren 2	b_post	2,91	44	0,936	0,141
	b_pre	2,05	44	0,939	0,142
Paaren 3	c_post	2,62	52	1,087	0,151
	c_pre	2,04	52	1,204	0,167
Paaren 4	d_post	2,80	51	1,020	0,143
	d_pre	2,24	51	1,176	0,165
Paaren 5	e_post	2,47	53	1,012	0,139
	e_pre	1,70	53	0,932	0,128
Paaren 6	f_post	2,65	51	1,036	0,145
	f_pre	2,06	51	1,066	0,149
Paaren 7	g_post	2,74	53	1,095	0,150
	g_pre	2,23	53	1,103	0,152
Paaren 8	h_post	2,71	51	0,965	0,135
	h_pre	1,98	51	1,104	0,155
Paaren 9	i_post	2,25	53	0,998	0,137
	i_pre	1,58	53	0,929	0,128
Paaren 10	j_post	2,49	51	0,903	0,126
	j_pre	1,71	51	0,901	0,126
Paaren 11	k_post	2,62	53	1,023	0,141
	k_pre	1,91	53	1,114	0,153
Paaren 12	l_post	2,47	51	1,007	0,141
	l_pre	1,78	51	0,923	0,129
Paaren 13	m_post	2,24	50	0,938	0,133
	m_pre	1,66	50	0,745	0,105
Paaren 14	n_post	2,47	51	0,946	0,132
	n_pre	1,88	51	0,909	0,127

Korrelationen bei gepaarten Stichproben

		N	Korrelation	Signifikanz s p	Signifikanz es p
Paaren 1	a_post &	48	0,641	0,000	0,000
Paaren 2	b_post &	44	0,561	0,000	0,000
Paaren 3	c_post &	52	0,715	0,000	0,000
Paaren 4	d_post &	51	0,723	0,000	0,000
Paaren 5	e_post &	53	0,725	0,000	0,000
Paaren 6	f_post &	51	0,707	0,000	0,000
Paaren 7	g_post &	53	0,751	0,000	0,000
Paaren 8	h_post &	51	0,689	0,000	0,000
Paaren 9	i_post &	53	0,610	0,000	0,000
Paaren 10	j_post &	51	0,722	0,000	0,000
Paaren 11	k_post &	53	0,508	0,000	0,000
Paaren 12	l_post &	51	0,692	0,000	0,000
Paaren 13	m_post &	50	0,382	0,003	0,006
Paaren 14	n_post &	51	0,648	0,000	0,000

Test bei gepaarten Stichproben

		Gepaarte Differenzen					
					Konfidenzintervall der Differenz		
		Mittelwert	Std.-Abweichung	Standardfehler des Mittelwertes	Unterer Wert	Oberer Wert	T
Paaren 1	a_post -	0,625	0,841	0,121	0,381	0,869	5,148
Paaren 2	b_post -	0,864	0,878	0,132	0,597	1,131	6,521
Paaren 3	c_post -	0,577	0,871	0,121	0,334	0,819	4,776
Paaren 4	d_post -	0,569	0,831	0,116	0,335	0,802	4,888
Paaren 5	e_post -	0,774	0,724	0,099	0,574	0,973	7,775
Paaren 6	f_post -	0,588	0,804	0,113	0,362	0,814	5,222
Paaren 7	g_post -	0,509	0,775	0,106	0,296	0,723	4,784
Paaren 8	h_post -	0,725	0,827	0,116	0,493	0,958	6,268
Paaren 9	i_post -	0,660	0,854	0,117	0,425	0,896	5,632
Paaren 10	j_post -	0,784	0,673	0,094	0,595	0,974	8,326
Paaren 11	k_post -	0,717	1,063	0,146	0,424	1,010	4,911
Paaren 12	l_post -	0,686	0,761	0,107	0,472	0,900	6,437
Paaren 13	m_post -	0,580	0,950	0,134	0,310	0,850	4,319
Paaren 14	n_post -	0,588	0,779	0,109	0,369	0,807	5,392

	Signifikanz	
df	Einseitiges p	Zweiseitiges p
47	0,000	0,000
43	0,000	0,000
51	0,000	0,000
50	0,000	0,000
52	0,000	0,000
50	0,000	0,000
52	0,000	0,000
50	0,000	0,000
52	0,000	0,000
50	0,000	0,000
52	0,000	0,000
50	0,000	0,000
49	0,000	0,000
50	0,000	0,000

Effektgrößen bei Stichproben mit paarigen Werten

			Standardisierer[a]	Punktschätzung	Konfidenzintervall	
					Wert	Wert
Paaren 1	a_post -	Cohen's d	0,841	0,743	0,420	1,060
Paaren 2	b_post -	Cohen's d	0,878	0,983	0,618	1,340
Paaren 3	c_post -	Cohen's d	0,871	0,662	0,359	0,960
Paaren 4	d_post -	Cohen's d	0,831	0,684	0,376	0,987
Paaren 5	e_post -	Cohen's d	0,724	1,068	0,726	1,403
Paaren 6	f_post -	Cohen's d	0,804	0,731	0,419	1,038
Paaren 7	g_post -	Cohen's d	0,775	0,657	0,357	0,952
Paaren 8	h_post -	Cohen's d	0,827	0,878	0,551	1,198
Paaren 9	i_post -	Cohen's d	0,854	0,774	0,463	1,078
Paaren 10	j_post -	Cohen's d	0,673	1,166	0,806	1,519
Paaren 11	k_post -	Cohen's d	1,063	0,675	0,373	0,971
Paaren 12	l_post -	Cohen's d	0,761	0,901	0,572	1,224
Paaren 13	m_post -	Cohen's d	0,950	0,611	0,306	0,910
Paaren 14	n_post -	Cohen's d	0,779	0,755	0,440	1,064

a. Der bei der Schätzung der Effektgrößen verwendete Nenner.
Cohen's d verwendet die Standardabweichung einer Stichprobe der Mittelwertdifferenz.
Hedges' Korrektur verwendet die Standardabweichung einer Stichprobe der Mittelwertdifferenz und einen Korrekturfaktor.

t-Test

Hinweise

Ausgabe erstellt		4 01:06:37
Kommentare		
Eingabe	Daten	C:\Users\lukas\OneDrive - Hochschule Ruhr West\Dokumente\HRW-WMA\Promotion\Publicatione
	Aktiver	DataSet1
	Filter	Education
	Gewichtu	<keine>
	Aufgeteilt	<keine>
	Anzahl der Zeilen in der	67
Behandlung fehlender Werte	Definition für "fehlend"	Benutzerdefinierte fehlende Werte
	Verwendete Fälle	Die Statistiken für jede Analyse basieren auf den Fällen, die für keine der Variablen

Syntax		T-TEST PAIRS=a_post b_post c_post d_post e_post f_post g_post h_post i_post j_post k_post l_post m_post n_post WITH a_pre
Ressourcen	Prozessor	0:00:00,02
	Verstriche	0:00:00,01

Statistik bei gepaarten Stichproben

		Mittelwert	N	Std.-Abweichung	Standardfehler des Mittelwertes
Paaren 1	a_post	3,02	66	0,850	0,105
	a_pre	2,29	66	0,837	0,103
Paaren 2	b_post	2,93	67	0,926	0,113
	b_pre	2,15	67	0,942	0,115
Paaren 3	c_post	2,70	67	1,000	0,122
	c_pre	2,00	67	0,905	0,111
Paaren 4	d_post	2,76	66	0,978	0,120
	d_pre	2,11	66	1,083	0,133
Paaren 5	e_post	2,34	65	0,989	0,123
	e_pre	1,55	65	0,685	0,085
Paaren 6	f_post	2,70	67	1,155	0,141
	f_pre	2,09	67	1,125	0,137
Paaren 7	g_post	2,82	66	0,991	0,122
	g_pre	2,11	66	0,963	0,119
Paaren 8	h_post	2,62	65	0,979	0,121
	h_pre	1,86	65	0,827	0,103
Paaren 9	i_post	2,42	66	1,053	0,130
	i_pre	1,56	66	0,914	0,112
Paaren 10	j_post	2,34	67	1,038	0,127
	j_pre	1,57	67	0,763	0,093
Paaren 11	k_post	2,45	66	0,931	0,115
	k_pre	1,67	66	0,730	0,090
Paaren 12	l_post	2,41	66	0,960	0,118
	l_pre	1,73	66	0,775	0,095
Paaren 13	m_post	2,45	67	1,034	0,126
	m_pre	1,79	67	0,845	0,103
Paaren 14	n_post	2,55	67	0,974	0,119
	n_pre	1,87	67	0,869	0,106

Korrelationen bei gepaarten Stichproben

		N	Korrelation	Signifikanz	
				s p	es p
Paaren 1	a_post &	66	0,578	0,000	0,000
Paaren 2	b_post &	67	0,743	0,000	0,000
Paaren 3	c_post &	67	0,737	0,000	0,000
Paaren 4	d_post &	66	0,708	0,000	0,000
Paaren 5	e_post &	65	0,572	0,000	0,000
Paaren 6	f_post &	67	0,803	0,000	0,000
Paaren 7	g_post &	66	0,617	0,000	0,000
Paaren 8	h_post &	65	0,609	0,000	0,000
Paaren 9	i_post &	66	0,628	0,000	0,000
Paaren 10	j_post &	67	0,707	0,000	0,000
Paaren 11	k_post &	66	0,475	0,000	0,000
Paaren 12	l_post &	66	0,586	0,000	0,000
Paaren 13	m_post &	67	0,647	0,000	0,000
Paaren 14	n_post &	67	0,519	0,000	0,000

Test bei gepaarten Stichproben

		Gepaarte Differenzen					T
		Mittelwert	Std.-Abweichung	Standardfehler des Mittelwertes	95% Konfidenzintervall der Differenz		
					Unterer Wert	Oberer Wert	
Paaren 1	a_post -	0,727	0,775	0,095	0,537	0,918	7,619
Paaren 2	b_post -	0,776	0,670	0,082	0,613	0,940	9,480
Paaren 3	c_post -	0,701	0,697	0,085	0,532	0,871	8,242
Paaren 4	d_post -	0,652	0,794	0,098	0,456	0,847	6,666
Paaren 5	e_post -	0,785	0,820	0,102	0,582	0,988	7,719
Paaren 6	f_post -	0,612	0,717	0,088	0,437	0,787	6,988
Paaren 7	g_post -	0,712	0,855	0,105	0,502	0,922	6,765
Paaren 8	h_post -	0,754	0,811	0,101	0,553	0,955	7,497
Paaren 9	i_post -	0,864	0,857	0,106	0,653	1,074	8,184
Paaren 10	j_post -	0,776	0,735	0,090	0,597	0,955	8,645
Paaren 11	k_post -	0,788	0,869	0,107	0,574	1,001	7,370
Paaren 12	l_post -	0,682	0,807	0,099	0,483	0,880	6,865
Paaren 13	m_post -	0,657	0,808	0,099	0,460	0,854	6,652
Paaren 14	n_post -	0,687	0,908	0,111	0,465	0,908	6,189

df	Signifikanz: Einseitiges p	Signifikanz: Zweiseitiges p
65	0,000	0,000
66	0,000	0,000
66	0,000	0,000
65	0,000	0,000
64	0,000	0,000
66	0,000	0,000
65	0,000	0,000
64	0,000	0,000
65	0,000	0,000
66	0,000	0,000
65	0,000	0,000
65	0,000	0,000
66	0,000	0,000
66	0,000	0,000

Effektgrößen bei Stichproben mit paarigen Werten

			Standardisierer[a]	Punktschätzung	Konfidenzintervall	
					Wert	Wert
Paaren 1	a_post -	Cohen's d	0,775	0,938	0,645	1,225
Paaren 2	b_post -	Cohen's d	0,670	1,158	0,845	1,466
Paaren 3	c_post -	Cohen's d	0,697	1,007	0,710	1,299
Paaren 4	d_post -	Cohen's d	0,794	0,820	0,539	1,097
Paaren 5	e_post -	Cohen's d	0,820	0,957	0,661	1,249
Paaren 6	f_post -	Cohen's d	0,717	0,854	0,571	1,131
Paaren 7	g_post -	Cohen's d	0,855	0,833	0,550	1,111
Paaren 8	h_post -	Cohen's d	0,811	0,930	0,636	1,219
Paaren 9	i_post -	Cohen's d	0,857	1,007	0,708	1,302
Paaren 10	j_post -	Cohen's d	0,735	1,056	0,754	1,353
Paaren 11	k_post -	Cohen's d	0,869	0,907	0,618	1,192
Paaren 12	l_post -	Cohen's d	0,807	0,845	0,561	1,124
Paaren 13	m_post -	Cohen's d	0,808	0,813	0,534	1,087
Paaren 14	n_post -	Cohen's d	0,908	0,756	0,482	1,026

a. Der bei der Schätzung der Effektgrößen verwendete Nenner.
Cohen's d verwendet die Standardabweichung einer Stichprobe der Mittelwertdifferenz.
Hedges' Korrektur verwendet die Standardabweichung einer Stichprobe der Mittelwertdifferenz und einen Korrekturfaktor.

t-Test

Hinweise

Ausgabe erstellt		4 01:08:36
Kommentare		
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	Gewichtu	<keine>
	Aufgeteilt	<keine>
	Anzahl der Zeilen in der	84
Behandlung fehlender Werte	Definition für "fehlend"	Benutzerdefinierte fehlende Werte
	Verwendete Fälle	Die Statistiken für jede Analyse basieren auf den Fällen, die für keine der Variablen

Syntax		T-TEST PAIRS=a_post b_post c_post d_post e_post f_post g_post h_post i_post j_post k_post l_post m_post n_post WITH a_pre
Ressourcen	Prozessor	0:00:00,00
	Verstriche	0:00:00,01

Statistik bei gepaarten Stichproben

		Mittelwert	N	Std.-Abweichung	Standardfehler des Mittelwertes
Paaren 1	a_post	3,51	84	0,898	0,098
	a_pre	3,07	84	0,991	0,108
Paaren 2	b_post	3,32	84	0,920	0,100
	b_pre	2,86	84	0,959	0,105
Paaren 3	c_post	2,99	84	0,857	0,094
	c_pre	2,55	84	0,962	0,105
Paaren 4	d_post	3,23	83	0,888	0,097
	d_pre	2,82	83	0,977	0,107
Paaren 5	e_post	2,74	82	0,940	0,104
	e_pre	2,07	82	0,953	0,105
Paaren 6	f_post	2,89	82	0,943	0,104
	f_pre	2,46	82	0,905	0,100
Paaren 7	g_post	2,89	83	1,059	0,116
	g_pre	2,49	83	1,017	0,112
Paaren 8	h_post	2,86	84	1,008	0,110
	h_pre	2,25	84	0,980	0,107
Paaren 9	i_post	2,63	83	1,067	0,117
	i_pre	1,88	83	0,968	0,106
Paaren 10	j_post	2,65	83	1,005	0,110
	j_pre	1,93	83	0,947	0,104
Paaren 11	k_post	2,86	83	1,117	0,123
	k_pre	2,16	83	1,018	0,112
Paaren 12	l_post	2,80	83	1,009	0,111
	l_pre	2,37	83	0,996	0,109
Paaren 13	m_post	2,67	84	1,123	0,123
	m_pre	2,02	84	0,981	0,107
Paaren 14	n_post	2,89	84	1,030	0,112
	n_pre	2,43	84	0,997	0,109

Korrelationen bei gepaarten Stichproben

		N	Korrelation	Signifikanz	
				s p	es p
Paaren 1	a_post &	84	0,730	0,000	0,000
Paaren 2	b_post &	84	0,763	0,000	0,000
Paaren 3	c_post &	84	0,797	0,000	0,000
Paaren 4	d_post &	83	0,821	0,000	0,000
Paaren 5	e_post &	82	0,751	0,000	0,000
Paaren 6	f_post &	82	0,682	0,000	0,000
Paaren 7	g_post &	83	0,741	0,000	0,000
Paaren 8	h_post &	84	0,683	0,000	0,000
Paaren 9	i_post &	83	0,735	0,000	0,000
Paaren 10	j_post &	83	0,690	0,000	0,000
Paaren 11	k_post &	83	0,771	0,000	0,000
Paaren 12	l_post &	83	0,768	0,000	0,000
Paaren 13	m_post &	84	0,772	0,000	0,000
Paaren 14	n_post &	84	0,726	0,000	0,000

Test bei gepaarten Stichproben

		Gepaarte Differenzen					
					95% Konfidenzintervall der Differenz		
		Mittelwert	Std.-Abweichung	Standardfehler des Mittelwertes	Unterer Wert	Oberer Wert	T
Paaren 1	a_post -	0,440	0,700	0,076	0,289	0,592	5,765
Paaren 2	b_post -	0,464	0,648	0,071	0,324	0,605	6,563
Paaren 3	c_post -	0,440	0,588	0,064	0,313	0,568	6,865
Paaren 4	d_post -	0,410	0,564	0,062	0,287	0,533	6,618
Paaren 5	e_post -	0,671	0,668	0,074	0,524	0,817	9,097
Paaren 6	f_post -	0,427	0,738	0,081	0,265	0,589	5,241
Paaren 7	g_post -	0,398	0,748	0,082	0,234	0,561	4,843
Paaren 8	h_post -	0,607	0,792	0,086	0,435	0,779	7,028
Paaren 9	i_post -	0,747	0,746	0,082	0,584	0,910	9,117
Paaren 10	j_post -	0,723	0,770	0,085	0,555	0,891	8,552
Paaren 11	k_post -	0,699	0,728	0,080	0,540	0,858	8,744
Paaren 12	l_post -	0,422	0,683	0,075	0,273	0,571	5,626
Paaren 13	m_post -	0,643	0,722	0,079	0,486	0,800	8,159
Paaren 14	n_post -	0,464	0,752	0,082	0,301	0,627	5,661

	Signifikanz	
df	Einseitiges p	Zweiseitiges p
83	0,000	0,000
83	0,000	0,000
83	0,000	0,000
82	0,000	0,000
81	0,000	0,000
81	0,000	0,000
82	0,000	0,000
83	0,000	0,000
82	0,000	0,000
82	0,000	0,000
82	0,000	0,000
82	0,000	0,000
83	0,000	0,000
83	0,000	0,000

Effektgrößen bei Stichproben mit paarigen Werten

			Standardisierer[a]	Punktschätzung	Konfidenzintervall Wert	Wert
Paaren 1	a_post -	Cohen's d	0,700	0,629	0,393	0,862
Paaren 2	b_post -	Cohen's d	0,648	0,716	0,474	0,954
Paaren 3	c_post -	Cohen's d	0,588	0,749	0,505	0,989
Paaren 4	d_post -	Cohen's d	0,564	0,726	0,483	0,967
Paaren 5	e_post -	Cohen's d	0,668	1,005	0,737	1,268
Paaren 6	f_post -	Cohen's d	0,738	0,579	0,343	0,811
Paaren 7	g_post -	Cohen's d	0,748	0,532	0,300	0,760
Paaren 8	h_post -	Cohen's d	0,792	0,767	0,521	1,009
Paaren 9	i_post -	Cohen's d	0,746	1,001	0,735	1,263
Paaren 10	j_post -	Cohen's d	0,770	0,939	0,678	1,195
Paaren 11	k_post -	Cohen's d	0,728	0,960	0,697	1,218
Paaren 12	l_post -	Cohen's d	0,683	0,617	0,381	0,851
Paaren 13	m_post -	Cohen's d	0,722	0,890	0,635	1,141
Paaren 14	n_post -	Cohen's d	0,752	0,618	0,383	0,850

a. Der bei der Schätzung der Effektgrößen verwendete Nenner.
Cohen's d verwendet die Standardabweichung einer Stichprobe der Mittelwertdifferenz.
Hedges' Korrektur verwendet die Standardabweichung einer Stichprobe der Mittelwertdifferenz und einen Korrekturfaktor.

t-Test

Hinweise

Ausgabe erstellt		4 01:09:32
Kommentare		
Eingabe	Daten	C:\Users\lukas\OneDrive - Hochschule Ruhr West\Dokumente\HRW-WMA\Promotion\Publicatione
	Aktiver	DataSet1
	Filter	Education
	Gewichtu	<keine>
	Aufgeteilt	<keine>
	Anzahl der Zeilen	36
Behandlung fehlender Werte	Definition für "fehlend"	Benutzerdefinierte fehlende Werte
	Verwendete Fälle	Die Statistiken für jede Analyse basieren auf den Fällen, die für keine der Variablen

Syntax		T-TEST PAIRS=a _post b_post c_post d_post e_post f_post g_post h_post i_post j_post k_post l_post m_post n_post WITH a_pre
Ressourcen	Prozessor	0:00:00,02
	Verstriche	0:00:00,01

Statistik bei gepaarten Stichproben

		Mittelwert	N	Std.-Abweichung	Standardfehler des Mittelwertes
Paaren 1	a_post	3,83	35	0,822	0,139
	a_pre	3,60	35	0,812	0,137
Paaren 2	b_post	3,75	36	0,874	0,146
	b_pre	3,39	36	1,103	0,184
Paaren 3	c_post	3,14	35	1,061	0,179
	c_pre	2,80	35	1,106	0,187
Paaren 4	d_post	3,72	36	0,974	0,162
	d_pre	3,44	36	1,107	0,184
Paaren 5	e_post	2,88	33	0,992	0,173
	e_pre	2,27	33	1,126	0,196
Paaren 6	f_post	3,47	36	0,971	0,162
	f_pre	3,11	36	1,008	0,168
Paaren 7	g_post	3,33	36	0,926	0,154
	g_pre	2,94	36	0,984	0,164
Paaren 8	h_post	3,14	36	0,961	0,160
	h_pre	2,69	36	1,009	0,168
Paaren 9	i_post	2,97	35	1,071	0,181
	i_pre	2,29	35	1,274	0,215
Paaren 10	j_post	2,94	34	1,099	0,189
	j_pre	2,15	34	1,132	0,194
Paaren 11	k_post	3,06	36	0,984	0,164
	k_pre	2,64	36	1,125	0,188
Paaren 12	l_post	3,06	36	0,791	0,132
	l_pre	2,78	36	0,929	0,155
Paaren 13	m_post	3,03	36	0,941	0,157
	m_pre	2,58	36	1,156	0,193
Paaren 14	n_post	3,08	36	0,841	0,140
	n_pre	2,83	36	1,000	0,167

Korrelationen bei gepaarten Stichproben

		N	Korrelation	Signifikanz s p	Signifikanz es p
Paaren 1	a_post &	35	0,864	0,000	0,000
Paaren 2	b_post &	36	0,904	0,000	0,000
Paaren 3	c_post &	35	0,877	0,000	0,000
Paaren 4	d_post &	36	0,886	0,000	0,000
Paaren 5	e_post &	33	0,842	0,000	0,000
Paaren 6	f_post &	36	0,821	0,000	0,000
Paaren 7	g_post &	36	0,868	0,000	0,000
Paaren 8	h_post &	36	0,841	0,000	0,000
Paaren 9	i_post &	35	0,826	0,000	0,000
Paaren 10	j_post &	34	0,811	0,000	0,000
Paaren 11	k_post &	36	0,896	0,000	0,000
Paaren 12	l_post &	36	0,795	0,000	0,000
Paaren 13	m_post &	36	0,799	0,000	0,000
Paaren 14	n_post &	36	0,900	0,000	0,000

Test bei gepaarten Stichproben

		Gepaarte Differenzen					
		Mittelwert	Std.-Abweichung	Standardfehler des Mittelwertes	95% Konfidenzintervall der Differenz Unterer Wert	95% Konfidenzintervall der Differenz Oberer Wert	T
Paaren 1	a_post -	0,229	0,426	0,072	0,082	0,375	3,174
Paaren 2	b_post -	0,361	0,487	0,081	0,196	0,526	4,448
Paaren 3	c_post -	0,343	0,539	0,091	0,158	0,528	3,762
Paaren 4	d_post -	0,278	0,513	0,086	0,104	0,451	3,247
Paaren 5	e_post -	0,606	0,609	0,106	0,390	0,822	5,714
Paaren 6	f_post -	0,361	0,593	0,099	0,160	0,562	3,654
Paaren 7	g_post -	0,389	0,494	0,082	0,222	0,556	4,719
Paaren 8	h_post -	0,444	0,558	0,093	0,256	0,633	4,781
Paaren 9	i_post -	0,686	0,718	0,121	0,439	0,932	5,648
Paaren 10	j_post -	0,794	0,687	0,118	0,555	1,034	6,744
Paaren 11	k_post -	0,417	0,500	0,083	0,247	0,586	5,000
Paaren 12	l_post -	0,278	0,566	0,094	0,086	0,469	2,943
Paaren 13	m_post -	0,444	0,695	0,116	0,209	0,679	3,839
Paaren 14	n_post -	0,250	0,439	0,073	0,101	0,399	3,416

	Signifikanz	
df	Einseitiges p	Zweiseitiges p
34	0,002	0,003
35	0,000	0,000
34	0,000	0,001
35	0,001	0,003
32	0,000	0,000
35	0,000	0,001
35	0,000	0,000
35	0,000	0,000
34	0,000	0,000
33	0,000	0,000
35	0,000	0,000
35	0,003	0,006
35	0,000	0,000
35	0,001	0,002

Effektgrößen bei Stichproben mit paarigen Werten

			Standardisierer[a]	Punktschätzung	Konfidenzintervall	
					Wert	Wert
Paaren 1	a_post -	Cohen's d	0,426	0,536	0,178	0,888
Paaren 2	b_post -	Cohen's d	0,487	0,741	0,367	1,107
Paaren 3	c_post -	Cohen's d	0,539	0,636	0,268	0,996
Paaren 4	d_post -	Cohen's d	0,513	0,541	0,188	0,888
Paaren 5	e_post -	Cohen's d	0,609	0,995	0,571	1,408
Paaren 6	f_post -	Cohen's d	0,593	0,609	0,249	0,962
Paaren 7	g_post -	Cohen's d	0,494	0,787	0,408	1,157
Paaren 8	h_post -	Cohen's d	0,558	0,797	0,417	1,168
Paaren 9	i_post -	Cohen's d	0,718	0,955	0,549	1,351
Paaren 10	j_post -	Cohen's d	0,687	1,157	0,715	1,587
Paaren 11	k_post -	Cohen's d	0,500	0,833	0,449	1,209
Paaren 12	l_post -	Cohen's d	0,566	0,491	0,141	0,834
Paaren 13	m_post -	Cohen's d	0,695	0,640	0,277	0,995
Paaren 14	n_post -	Cohen's d	0,439	0,569	0,213	0,918

a. Der bei der Schätzung der Effektgrößen verwendete Nenner.
Cohen's d verwendet die Standardabweichung einer Stichprobe der Mittelwertdifferenz.
Hedges' Korrektur verwendet die Standardabweichung einer Stichprobe der Mittelwertdifferenz und einen Korrekturfaktor.

	Date	Nr.	Age	Edu	Exp	a_pre	b_pre	c_pre	d_pre	e_pre	f_pre	g_pre	h_pre	i_pre	j_pre	k_pre	l_pre	m_pre	n_pre	a_post	b_post	c_post	d_post	e_post	f_post	g_post	h_post	i_post	j_post	k_post	l_post	post	n_post
1	17.02.2020	1	1	2	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2
2	17.02.2020	2	1	1	0	1	1	1	1	2	1	1	1	1	1	1	1	1	1	1	2	2	2	2	1	2	2	2	2	2	2	2	2
3	17.02.2020	3	1	2	0	2	1	1	1	1	1	2	1	1	1	1	1	1	2	2	2	2	2	1	1	2	1	1	1	1	1	1	2
4	17.02.2020	4	1	1	0	3	2	1	3	1	2	3	3	3	3	3	3	2	3	4	3	2	4	2	2	3	3	3	0	3	3	2	3
5	17.02.2020	5	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	3	2	3	2	2	2	3	2	2	3	2	3	1
6	17.02.2020	6	1	2	0	2	2	2	2	2	2	2	3	2	3	2	1	2	1	3	3	3	3	4	3	3	5	3	5	3	2	3	3
7	17.02.2020	7	1	1	0	3	2	1	1	1	1	1	1	1	1	1	1	1	1	4	2	2	2	2	2	2	2	2	2	2	2	2	2
8	17.02.2020	8	1	2	0	2	2	1	1	1	2	1	1	1	1	1	1	1	1	3	3	2	2	2	3	2	3	2	1	1	2	2	2
9	17.02.2020	9	1	1	0	3	2	1	3	1	2	3	2	1	2	3	2	3	3	3	3	2	2	3	2	3	3	2	2	3	2	3	3
10	17.02.2020	10	1	1	0	1	1	2	1	1	2	1	2	2	1	1	2	1	1	2	2	1	2	2	2	2	1	1	2	2	2	1	2
11	17.02.2020	11	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2
12	18.02.2020	1	1	3	0	4	4	4	3	3	3	3	3	3	3	3	3	3	3	4	4	4	3	3	4	4	4	3	3	4	3	3	3
13	18.02.2020	2	1	2	0	2	2	1	2	2	2	2	3	2	2	2	2	2	2	3	3	2	2	2	3	3	2	2	2	2	2	2	2
14	18.02.2020	3	1	1	0	2	3	2	1	1	1	2	1	1	1	1	1	1	1	3	4	2	2	2	3	3	3	2	2	4	2	1	1
15	18.02.2020	4	1	1	0	1	1	1	1	1	2	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2
16	18.02.2020	5	1	2	0	2	2	2	2	2	2	2	1	1	1	1	1	1	1	3	3	3	3	2	3	2	2	2	2	2	2	1	2
17	18.02.2020	6	1	2	0	2	3	3	3	2	2	3	2	2	2	2	2	2	2	2	3	3	3	2	2	3	2	2	2	2	2	2	2
18	18.02.2020	7	1	1	0	2	3	3	3	2	2	3	3	2	3	2	3	3	2	3	2	4	4	4	4	4	4	3	3	3	3		3
19	18.02.2020	8	1	3	0	4	3	4	4	2	4	3	2	2	2	4	4	2	4	4	4	4	4	3	4	3	3	3	3	4	4	3	4
20	18.02.2020	9	2	3	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	1	1	2	2	1	1	1	1	1	1	1
21	18.02.2020	10	1	2	0	1	2	1	1	2	2	2	1	1	1	1	2	2	2	2	3	2	2	2	3	3	2	3	2	2	2	2	2
22	18.02.2020	11	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	1	2	2	2	2	2	1	1	1
23	18.02.2020	12	1	1	0	2	1	1	1	1	1	3	2	2	1	2	1	1	1	3	4	3	2	2	2	4	3	3	3	3	3	2	3
24	18.02.2020	13	1	1	0	3	2	2	1	1	1	1	1	1	1	1	1	1	1			1	1	1	2	2	1	1	1	2	1	1	1
25	18.02.2020	14	1	1	0	3	2	2	1	1	1	1	1	1	1	1	1	1	1			1	1	1	2	2	1	1	1	2	1	1	1
26	02.03.2020	1	1	3	0	3	1	1	2	1	1	1	1	1	1	1	1	1	1	3	2	2	2	2	2	1	2	2	2	2	1	3	2
27	02.03.2020	2	1	2	0	2	1	2	2	1	1	2	1	1	1	1	1	1	1	3	3	3	3	2	2	3			2	2	3	2	2
28	02.03.2020	3	1	3	0	3	3	3	2	2	3	3	2	2	2	1	1	1	1	4	3	3	3	3	3	3	3	3	3	3	3	3	3
29	02.03.2020	4	1	1	0	3	3	3	3	2	3	2	2	3	2	1	1	1	1	3	3	3	3	3	2	2	2	2	3	3	3	3	3

30	02.03.2020	5	2	3	0	3	2	1	1	1	1	1	1	1	1	1	1	1	1	3	2	2	1	1	1	1	1	1	1	1	1	1	1
31	02.03.2020	6	1	3	0	2	2	3	2	2	3	3	3	2	2	1	3	2	1	5	4	4	3	3			4	4	3	3	3	3	4
32	02.03.2020	7	1	2	1	3	4	2	3	3	3	3	1	5	3	2	2	4	1	4	4	3	3	3	3	2	2	5	4	2	3	4	2
33	02.03.2020	8	1	3	0	4	3	2	2	2	2	3	2	2	3	2	2	2	2	4	3	3	3	3	3	3	4	2	4	3	3	3	3
34	02.03.2020	9	1	1	0	4	3	2	2	2	2	3	2	2	3	2	2	2	2	4	4	4	3	4	4	3	4	3	4	4	4	4	4
35	03.03.2022	1	1	2	0	2	1	2	1	2	2	2	2	2	2	2	2	2	2	3	3	5	5	5	5	5	5	5	5	5	5	5	5
36	03.03.2022	2	1	2	0	3	2		2	2	3	3	3	2	2	2	2	2	3	4	4	4	3	3	4	3	3	4	3	4	2	3	4
37	03.03.2022	3	1	2	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2
38	03.03.2022	4	1	1	0	3	2	1	3	1	1	2	1	1	1	1	3	1	3	4	2	2	3	2	2	3	3	2	3	2	3	1	3
39	03.03.2022	5	1	1	0	1	1	1	1	1	2	1	1	1	1	1	1	3	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2
40	03.03.2022	6	1	2	0	3	1	1	4	1	1	1	2	1	1	2	1	2	1	4	2	2	4	2	1	2	2	1	1	2	1	2	1
41	03.03.2022	7	1	5	0	3	3	2	2	2	3	3	3	3	2	3	2	3	1	4	4	4	3	3	5	4	3	4	3	3	2	3	2
42	03.03.2022	8	1	2	0	2	1	2	1	1	3	3	1	1	1	1	2	1	2	2	2	2	1	2	3	3	2	2	1	1	2	2	2
43	03.03.2022	9	1	1	0			3	3	1	3	3	3	1	1	1	3	2	3			3	3	2	3	3	4	2	2	2	3	2	3
44	09.03.2020	1	2	5	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2
45	09.03.2020	2	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2
46	09.03.2020	3	1	1	0	1	2	2	3	1	2	2	3	1	1	1	2	1	3	4	3	3	3	2	2	2	3	2	2	2	2	2	4
47	09.03.2020	4	1	1	0	1	2	2	3	1	4	3	2	3	2	2	1	1	2	4	3	3	4	2	5	4	3	4	3	3	2	3	3
48	09.03.2020	5	1	1	0	4	4	1	5	2	1	2	1	1	1	1	1	3	1	4	4	2	3	2	3	2	2	2	3	3	2	2	3
49	09.03.2020	6	1	1	0	1		1	1	1	1	1	1	1	1	1	1	1	1	2	2	2		2		2		2		2			2
50	09.03.2020	7	1	2	0	3	3	3	2	2	3	3	3	4	3	4	4	3	2	3	4	3	3	3	3	4	3	4	4	4	4	4	3
51	09.03.2020	8	1	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	3	3	3	3	3	3	3	3	3	3	3	3	3	3
52	09.03.2020	9	1	3	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1			1	1	1	1	1	1	1	1	1
53	09.03.2020	10	1	2	0	2	3	3	3	3	5	4	3	1	4	3	2	3	3	3	3	3	3	3	5	4	3	1	4	3	2	3	3
54	09.03.2020	11	1	1	0	3	2	1	2	2	2	2	2	2	2	2	2	2	2	3	3	3	3	3	3	3	3	3	3	3	3	3	3
55	09.03.2020	12	1	3	0	4	4	3	4	1	3	2	2	2	2	3	3	1	2	3	4	3	4	2	3	4	3	4	4	3	3	1	2
56	09.03.2020	13	1	3	0	1	1	3	3	3	3	3	3	2	4	2	1	3	3	3	3	3	4	3	4	4	4	4	4	4	4	4	4
57	09.03.2020	14	1	2	0	2	2	2	2	1	2	2	2	3	2	2	2	2	2	2	2	2	2	1	2	2	2	3	2	2	2	2	2
58	10.03.2020	1	1	2	0	2	1	1	1	1	1	1	1	2	1	1	1	2	1	3	2	2	2	2	2	2	2	2	2	2	2	2	2
59	10.03.2020	2	1	2	0																												
60	10.03.2020	3	1	2	0	2	2	1	1	1	1	1	1	1	1	1	1	1	1	3	3	1	2	1	2	2	2	2	2	2	2	2	2

61	10.03.2020	4	1	2	0	2	1	2	1	1	1	1	1	1	1	1	1	1	1	3	2	3	3	3	3	3	3	3	2	3	3	3	3
62	10.03.2020	5	1	2	0	2	2	1	1	1	1	1	1	1	1	1	1	1	1	3	3	3	3	2	2	3	3	3	3	3	2	3	4
63	10.03.2020	6	1	2	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	1	1	1	1	1	1	1	1	1
64	10.03.2020	7	1	3	0	3	3	3	3	2	2	1	1	2	1	2	2	1	1	4	3	3	3	3	2	2	2	2	2	2	2	3	2
65	10.03.2020	8	1	3	0	3	3	2	3	2	4	3	2	2	2	1	2	1	2	4	3	3	3	3	4	3	2	2	3	2	3	2	2
66	10.03.2020	9	2	4	0	4	4	2	3	2	4	1	2	1	1	2	2	1	2	5	5	3	4	3	5	2	3	2	2	3	3	2	3
67	10.03.2020	10	1	2	0	2	1	1	1	1	2	2	1	1	1	2	3	3	3	2	2	2	2	2	2	2	1	1	2	2	2	2	2
68	10.03.2020	11	1	1	0	2	2	4	4	5	5	4	5	5	5	5	4	3	4	2	2	3	3	4	5	4	3	5	5	5	4	3	4
69	10.03.2020	12	1	3	1	3	4	3	4	5	4	4	3	4	4	4	4	4	4	3	4	3	4	5	4	4	3	4	4	4	4	4	4
70	10.03.2020	13	1	2	0	1	1	2	1	2	1	1	1	1	1	1	1	1	1	4	3	3	3	3	2	4	3	3	3	2	4	3	3
71	10.03.2020	14	1	2	0	2	2	1	1	1	1	1	1	1	1	1	1	1	1	3	3	2	3	2	2	2	2	2	2	2	2	2	2
72	05.07.2022	1	1	1	0	2	2	2	3	2	2	2	2	2	2	2	2	2	2	3	4	3	3	3	2	3	4	3	3	3	4	3	3
73	05.07.2022	2	1	3	0	3	3	2	2	1	2	2	1	1	1	2	2	2	2	3	3	2	3	2	2	2	1	2	1	2	2	2	2
74	05.07.2022	3	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2
75	05.07.2022	4	4	5	0	2	1	1	2	1	2	2	2	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2
76	05.07.2022	5	2	2	0	3	2	3	3	1	2	2	1	1	1	2	1	1	2	3	3	3	3	1	2	2	2	2	2	2	2	2	2
77	05.07.2022	6	5	7	0	3	2	1	2	1	2	2	1	1	1	1	1	1	1	4	3	2	2	2	2	2	2	2	2	2	2	2	2
78	05.07.2022	7	1	3	0	1	2	2	1	1	2	2	1	1	1	1	2	1	2	1	2	2	1	1	2	2	1	1	1	1	2	1	2
79	05.07.2022	8	2	3	0	2	3	3	2	2	3	1	2	3	2	2	1	2	2	2	3	3	3	2	3	1	2	3	3	3	2	2	2
80	05.07.2022	9	1	2	0	3	2	2	3	1	2	2	2	1	1	1	1	1	2	3	3	3	3	2	3	3	2	2	2	2	2	2	2
81	05.07.2022	10	1	3	0	2	3	2	2	1	1	2	3	2	2	2	2	1	1	4	3	3	3	3	3	3	4	3	3	3	3	3	3
82	05.07.2022	11	1	2	0	2	4	2	4	2	5	3	3	1	2	2	1	3	1	3	4	3	4	3	5	3	4	2	3	2	2	3	2
83	03.11.2022	1	1	3	0	3	3	1	3	3	3	4	2	1	1	1	1	1	1	4	4	1	3	3	3	4	2	2	2	2	2	1	2
84	03.11.2022	2	1	3	0	3	2	1	2	1	2	2	2	1	1	1	2	1	2	3	2	1	2	1	2	2	2	1	1	1	2	1	2
85	03.11.2022	3	2	4	0	2	3	3	3	4	3	4	3	2	3	4	4	4	3	3	4	4	4	4	3	4	4	3	4	4	3	3	3
86	03.11.2022	4	1	2	0	1	2	2	2	2	2	2	2	0	2	2	2	2	2	3	3	3	3	3	3	3	3	3	3	3	3	3	3
87	03.11.2022	5	1	3	0	2	2	2	2	2	2	2	2	1	2	2	2	2	2	3	3	3	3	3	3	3	3	3	3	3	3	3	3
88	03.11.2022	6	1	1	0	2	3	2	3	2	1	2	2	1	3	2	2	2	2	2	3	2	3	2	2	3	2	1	3	3	3	2	1
89	03.11.2022	7	1	2	0	3	3	3	3	1	2	2	2	3	2	2	1	2	2	4	4	4	4	4	4	3	4	4	3	4	3	3	2
90	03.11.2022	8	1	3	0	4	1	4	2	2	2	3	4	1	3	2	3	3	3	5	4	4	4	4	4	4	4	4	4	4	4	3	4
91	03.11.2022	9	1	1	0	1	2	1	1	1	2	3	1	1	1	1	1	1	1	2	2	2	2	2	2	3	2	2	2	2	2	2	2

92	03.11.2022	10	1	3	0	1	1	1	1	1	1	2	1	1	1	1	1	1	1	2	2	3	3	3	2	3	2	3	3	3	2	3	2
93	03.11.2022	11	1	2	0	3	3	3	3	2	2	3	2	3	2	3	3	2	3	3	3	3	3	2	2	3	2	3	2	3	3	2	3
94	03.11.2022	12	1	2	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2
95	03.11.2022	13	1	2	0	3	3	3	4	3	4	2	3	1	2	2	3	3	1	3	3	3	4	3	4	3	3	2	2	2	3	3	1
96	03.11.2022	14	1	2	0	1	1	1	2	1	1	3	1	2	1	2	1	1	1	1	1	1	2	1	1	3	1	2	1	2	1	1	1
97	03.11.2022	15	1	2	0	3	2	1	2	1	3	2	2	1	1	1	1	1	2	3	2	1	2	1	3	2	2	1	1	1	1	1	2
98	03.11.2022	16	2	3	0	3	3	3	2	2	3	2	3	2	2	2	3	3	3	4	4	4	3	3	3	0	4	3	2	3	3	4	3
99	03.11.2022	17	1	1	0	3	2	2	2	2	2	2	2	1	2	2	2	2	2	3	2	2	2	2	2	2	2	1	2	2	2	2	2
100	03.11.2022	18	2	4	0	3	2	2	2	1	2	2	2	1	1	2	2	1	2	3	3	3	2	2	2	2	3	2	2	2	2	1	2
101	09.11.2022	1	1	2	0	3	4	3	2	3	2	2	2	2	2	3	2	3	2	4	5	4	3	4	3	3	3	3	3	4	3	4	3
102	09.11.2022	2	5	6	0	4	4	3	4	2	2	2	2	1	2	2	2	2	3	4	4	4	4	3	3	3	3	2	2	2	3	2	3
103	09.11.2022	3	1	1	0	2	1	4	2	4	2	4	4	1	1	2	3	2	2	3	2	4	3	4	4	4	4	2	2	3	4	2	2
104	09.11.2022	4	1	1	0		1	4	2	4	2	3	4	4	1	3	2	1	2	2	3	2	3	5	2	4	4	3	2	2	1	2	3
105	09.11.2022	5	1	1	0	3	1	3	4	2	4	4	1	1	2	3	2	2		3	2	3	4	3	4	4	2	2	2	3	2	3	
106	09.11.2022	6	1	2	0	3	2	2	5	2	5	4	3	1	1	1	2	1	4	3	3	3	5	3	5	5	4	2	2	2	3	2	5
107	09.11.2022	7	1	3	0	5	3	4	4	1	2	4	1	3	1	2	1	1	2	5	4	4	4	2	3	4	3	4	3	3	2	1	2
108	09.11.2022	8	2	5	0		2	2	3	2	1	2	2	1	1	2	2	2	2	3	3	3	3		3	3	2	2	3	3	3	2	3
109	09.11.2022	9	0	1		3	3	2	3	3	2	3	2	1	2	3	2	2	2	3	3	3	3	3	3	2	3	2	3	1	2	1	2
110	10.11.2022	1	2	1	0	5	3	5		2		5	2	1	3	5	3	3	4	5	4	5		4		5	3	4	4	5	5	5	4
111	10.11.2022	2	1	1	0	2	2	1	2	1	1	1	2	1	2	2	2	1	2	2	3	1	2	1	1	1	3	2	3	3	3	2	2
112	10.11.2022	3	1	3	0	2	2	2	3	2	2	2	1	2	2	2	2	2	2	4	4	3	3	4	3	4	4	4	4	4	4	4	4
113	10.11.2022	4	2	3	0	3	2	2	3	1	2	1	2	3	2	2	2	2	2	4	3	3	4	3	3	3	3	4	3	3	3	3	3
114	10.11.2022	5	1	3	0	4	2	2	3	2	2	2	1	1	1	1	3	1	3	5	3	4	4	3	3	3	3	2	2	2	4	2	4
115	10.11.2022	6	4	4	0	4	4	4	4	2	3	2	1	1		1	4	4	4	4	4	4	4	3	4	3	1	3		2	4	4	4
116	10.11.2022	7	1	3	0	3	3	3	4	3	4	2	3	2	2	3	3	3	3	4	3	3	4	4	4	3	4	2	2	3	3	4	4
117	10.11.2022	8	1	2	0	3	3	2	3	2	2	3	2	1	2	3	2	1	3	2	3	2	3	2	2	3	2	1	2	3	2	1	3
118	10.11.2022	9	1	2	0	3	3	4	3	2	2	2	2	1	1	2	2	1	2	3	4	4	3	3	3	2	3	2	2	2	2	1	2
119	10.11.2022	10	1	3	0	4	4	3	3	3	4	4	2	3	1	2	4	3	5	4	4	3	3	3	4	4	3	3	2	3	4	3	5
120	10.11.2022	11	1	3	0	3	3	3	2	2		1	2	1	1		3	1	3	3	3	3	2	2		2	2	2	2		3	2	3
121	10.11.2022	12	2	3	0	4	4	3	3	4	4	4	4	2	2	4	4	3	4	4	4	3	3	4	4	4	4	3	3	4	4	3	4
122	10.11.2022	13	2	4	0	4	4	2	3		2	2	2	1	1	2	3	2	3	4	4	2	3		3	3	2	2	3	3	4	4	3

123	10.11.2022	14	2	3	0	5	3	4	5	1	3	4	3	2	2	2	4	1	3	5	4	4	5	2	4	5	4	2	2	2	5	2	4
124	10.11.2022	15	1	3	0	3	4	4	5	1	3	4	3	2	3	2	2	3	4	3	4	4	5	3	4	4	3	3	3	3	2	3	4
125	10.11.2022	16	1	3	0	4	4	3	4	3	2	2	2	2	2	3	3	3	3	5	5	5	5	5	5	4	5	4	5	5	5	5	5
126	10.11.2022	17	1	3	0	4	5	3	3	2	2	3	2	1	1	1	2	1	1	4	5	3	4	2	2	3	4	3	3	3	3	2	1
127	10.11.2022	18	1	4	0	4	4	3	3	2	3	4	2	2	2	3	2	2	5	4	4	4	5	4	3	5	4	4	4	4	4	3	5
128	10.11.2022	19	1	3	0	2	3	2	3	1	1	2	2	1	2	2	2	2	2	3	3	3	3	2	1	2	2	2	2	3	2	2	2
129	10.11.2022	20	2	3	0	2	2	2	2	2	2	2	2	1	1	1	1	1	1	3	3	2	3	3	2	3	3	2	2	2	2	2	2
130	21.11.2022	1	3	5	0	4	4	3	3	1	4	4	2	1	1	2	2	1	2	4	4	3	4	1	4	4	3	2	2	2	2	3	3
131	21.11.2022	2	1	1	0	2	3	1	2	2	3	3	2	1	1	4	1	1	2	2		2	2	2	2	2	2	2	2	2	2	2	2
132	21.11.2022	3	1	3	0	4	3	1	2	2	2	1	1	1	1	2	2	1	2	4	4	3	3	4	4	3	3	2	2	2	2	2	2
133	21.11.2022	4	1	2	0	2	1	2	2	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2
134	21.11.2022	5	1	2	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2
135	21.11.2022	6	1	2	0	1	2	3	2	1	2	1	1	1	1	2	2	2	2	3	3	4	3	3	3	3	3	3	3	3	3	3	3
136	21.11.2022	7	1	1		1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2
137	21.11.2022	8	1	1	0	3	4	4	4	2	3	3	4	2	3	3	4	3	3	3		4	4	2	3	3	4	2	3	3	4	3	3
138	21.11.2022	9	1	1	0	3	3	3	3	3	3	3		1		3		3		3	3	4	4	4	3	4	4	2	3	4			
139	23.11.2022	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2
140	23.11.2022	2	1	1	0	3	2	1	1	1	2	1	1	1	1	1	1	1	1	3	3	2	1	2	3	2	2	2	2	2	2	2	2
141	23.11.2022	3	1	2	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	5	5	5	5	5	5	5	5	5	5	5	5	5	5
142	23.11.2022	4	1	1 +	0	1	2	1	2	1	3	5	1	1	2	1		3	1	3	5	3	4	1	3	3	1	3	5	1		5	1
143	23.11.2022	5	1	1	0	3	2	1	1	1	1	2	1	4	2	1	1	1	1	2	3	3	4	3	3	4	3	4	4	3	2	3	3
144	23.11.2022	6	1	2	0	4	3	2	4	1	3	4	3	1	1	2	2	4	2	4	3	2	4	1	3	4	3	2	1	2	2	3	2
145	23.11.2022	7	1	1	0	4	5	5	4	2	3	5	5	2	3	2	2	2	2	4	5	5	4	2	3	5	5	2	3	2	2	2	2
146	23.11.2022	8	1	2	0	1	1	1	2	1	1	1	1	1	1	1	1	1	1	2	1	1	2	1	1	1	1	1	2	1	1	1	1
147	23.11.2022	9	1	2	0																												
148	23.11.2022	10	1	3	0	3	2	1	2	1	2	2	3	3	3	2	2	2	2	2	3	2	3	2	3	2	2	3	3	2	2	3	2
149	23.11.2022	11	1	1	0																												
150	23.11.2022	12	1	1	0																												
151	23.11.2022	13	1	2	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2
152	23.11.2022	14	1	2	0		2	1	2	1	2	2	2	1	1	1		2	1		3	3	3	3	3	3	3	2	3	3		3	3
153	23.11.2022	15	1	3	0	3	2	1	2	1	2	2	1	1	2	1	2	1	3	3	2	2	2	2	2	2	2	2	2	2	2	2	3

154	24.11.2022	1	1	3	0	3	2	3	3		3	4	3	2	3	4	4	3	3	3	2	3	3		3	4	3	2	3	4	4	3	3
155	24.11.2022	2	1	5	0	2	1		1	1	1	2	1	1	1	1	1	1	1	2	2		2	2	2	2	2	2	2	2	2	2	2
156	24.11.2022	3	1	2	0	3	2	2	1	1	1	2	3	2	1	1	3	2	4	4	3	3	2	2	2	3	4	3	2	2	4	3	4
157	24.11.2022	4	1	3	0	3	2	2	3	2	2	3	2	1	1	3	4	3	3	4	3	3	4	3	3	4	3	2	2	4	4	4	4
158	24.11.2022	5	3	5	0	4	4	4	4	3	4	4	4	3	3	3	4	3	4	4	4	4	4	4	5	5	4	4	4	4	4	4	5
159	24.11.2022	6	1	3	0	3	2	1	2	1	1	2	1	1	1	1	1	1	2	4	3	2	2	2	2	2	2	2	2	2		2	3
160	24.11.2022	7	1	2	0	4	1	1	1	1	1	1	1	1	1	1	1	1	1	4	1	1	1	1	1	1	1	1	1	1	1	1	1
161	24.11.2022	8	1	3	0	3	3	3	4	3	3	5	2	2	3	4	3	4	2	4	5	4	5	3	2	5	3	3	5	5	3	5	3
162	24.11.2022	9	1	2	0	3	2	1	1	1	1	1	1	1	1	1	1	2	2	4	3	2	2	2	2	2	2	2	2	2	2	3	3
163	24.11.2022	10	1	3	0	3	3	3	3	1	2	2	1	2	1	2	2	1	2	3	3	3	3	2	2	3	3	3	3	3	3	3	3
164	24.11.2022	11	1	3	0	4	5	3	1	1	2	1	2	1	1	2	1	1	2	4	5	3	2	2	3	1	3	1	2	2	1	2	3
165	24.11.2022	12	1	3	0	3	3	3	3	2	2	2	3	1	2	2	3	2	2	4	3	3	3	3	3	3	3	3	3	3	3	3	3
166	24.11.2022	13	4	7	0	5	5	5	5	5	5	4	5	5	5	5	4	4	4	5	5	5	5	5	5	4	5	5	5	5	4	4	4
167	24.11.2022	14	1	2	0	2	2	2	2	2	2	2	2	2	2	2	2	2	2	5	5	5	5	5	5	5	5	5	5	5	5	5	5
168	24.11.2022	15	2	2	0	3	2	1	2	1	3	2	2	1	2	2	2	1	2	3	2	1	2	1	3	2	2	1	2	2	2	1	2
169	24.11.2022	16	2	2	0	4	3	4	4	3	5	4	4	2	2	2	2	2	4	4	3	4	4	3	5	4	4	2	2	2	3	2	3
170	24.11.2022	17	1	4	0	4	4	4	3	3	5	4	4	4	4	3	4	4	3	5	5	5	4	4	5	5	5	5	5	4	5	5	4
171	24.11.2022	18	1	3	0	3	3	3	3	3	3	2	3	2	3	2	2	2	3	3	3	3	3	3	3	2	3	2	3	3	3	3	3
172	30.11.2022	1	1	2	0	2	1	2	1	1	1		1	1	1	2	2	1	1	2	2	2	2	2	2	0	2	2	2	2	2	2	2
173	30.11.2022	2	1	1		2	2		1	2	1	3	2	2	3	3	2	3	3	2	2		2	1	2	1	2	1	2	1	2	1	2
174	30.11.2022	3	1	3	0	3	4	3	3	3	3	3	4	1	2	2	3	3	4	3	4	3	3	3	3	3	4	2	3	3	3	3	4
175	30.11.2022	4	1	1	0	3	2	3	3	3	4	4	4	1	2	1	1	2	2	4	5	4	4	4	4	5	4	4	3	4	3	3	3
176	30.11.2022	5	2	3	1	3	3	3	3	2	2	2	2	2	2	3	2	2	2	3	3	3	3	3	3	2	2	3	3	3	2	3	2
177	30.11.2022	6	5	5	0	4	2	2	3	2	3	3	3	2	2	2	3	2	3	4	3	3	3	3	3	3	3	3	3	3	3	3	3
178	30.11.2022	7	1	2	0	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	1	2	1	1	1	1	1	2	2	1	2
179	30.11.2022	8	1	1	0			2	1	1	1	2	1	2	1	2	1	2	1			2	1	1	2	1	2	1	2	1	2	1	1
180	30.11.2022	9	1	1	0	4		1	1	1	1	1	1	1	1	1	1	1	1	3		3	3	3	3	3	3	3	3	3	3	3	3
181	30.11.2022	10	2	3	0	2	2	2	3	2	2	2	2	1	1	2	3	2	3	3	2	3	3	2	3	2	2	2	2	2	3	2	3
182	01.12.2022	1	1	3	0	4	4	4	4	2	4	3	3	3	3	4	3	3	3	5	5	4	4	2	4	3	3	4	4	5	3	3	3
183	01.12.2022	2	1	3	1	4	4	4	3	3	2	4	4	5	4	5	4	3	3	4	4	4	4	3	2	4	5	5	4	5	4	3	3
184	01.12.2022	3	1	2	0	3	3	3	3	3	2	3	3	4	3	3	3	3	3	3	3	4	4	3	2	4	4	4	3	4	3	5	4

185	01.12.2022	4	1	2	0	3	3	2	2	1	2	4	3	1	1	1	2	3	3	4	3	2	2	1	2	4	3	2	1	4	2	3	3
186	01.12.2022	5	2	2	0	3	3	2	5	2	1	3	3	2	2	3	2	2	3	3	3	2	5	2	1	3	3	2	2	3	2	2	3
187	01.12.2022	6	1	3	0	3	4	3	3	1	2	3	2	1	2	2	3	2	3	3	4	3	3	2	3	3	2	2	2	2	3	2	3
188	01.12.2022	7	1	2	0	2	3	2	2	1	2	2	2	1	2	1	1	1	1	3	4	3	3	2	4	2	3	3	3	4	3	2	3
189	01.12.2022	8	1	3	0	5	2	2	1	1	3	4	3	1	1	2	1	1	3	5	3	3	3	2	2	5	3	2	2	3	2	2	2
190	01.12.2022	9	1	3	0	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
191	01.12.2022	10	1	3	1	3	3	2	2	2	2	2	2	2	2	2	2	2	2	3	3	3	3	3	3	3	3	3	3	3	3	3	3
192	01.12.2022	11	1	3	1	3	2	2	3	2	3	3	3	2	1	1	2	1	2	3	2	2	3	2	3	3	3	2	1	1	2	1	2
193	01.12.2022	12	1	3	1	5	4	4	3	4	3	3	3	4	3	3	3	3	4	5	5	4	4	4	5	4	4	4	4	4	3	5	4
194	01.12.2022	13	1	3	1	3	3	3	3	4	3	2	2	3	2	3	2	3	3	3	3	3	3	4	3	3	3	3	3	3	3	3	3
195	01.12.2022	14	2	4	1	3	5	3	4	4	3	4	4	3	3	4	3	4	4	3	5	3	4	4	3	4	4	4	3	4	3	4	4
196	01.12.2022	15	1	3	1	3	2	2	2	1	2	2	1	1	1	1	2	1	2	4	3	2	3	2	2	2	2	2	2	2	2	1	2
197	01.12.2022	16	1	3	0	3	3	3	4	4	3	3	3	3	4	4	4	4	4	3	3	3	4	4	3	3	4			5	5	5	5
198	01.12.2022	17	4	7	0	3	2	3	4	2	4	4	2	1	1	1	2	1	2	4	3	3	4	2	5	5	3	4	3	1	3	3	2
199	01.12.2022	18	1	2	0	3	2	2	2	2	3	3	2	3	2	2	3	2	2	4	3	3	3	3	4	4	3	4	3	3	4	3	3
200	08.12.2022	1	1	3	1	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
201	08.12.2022	2	1	3	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
202	08.12.2022	3	2	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	3	3	3	3	3	3	3	3	3	3	3	3	3	3
203	08.12.2022	4	1	3	1	4	3	3	4	3	5	5	4	3	4	4	5	4	5	4	4	4	4	4	4	3	4	4	3	5	4	5	4
204	08.12.2022	5	1	3	0	2	2	2	2	2	2	1	2	2	2	2	2	2	1	3	3	3	3	3	2	2	3	2	2	2	2	2	2
205	08.12.2022	6	1	2	0	2	2	1	1	1	1	1	1	1	1	1	1	1	1	3	3	2	1	1	1	1	2	1	1	2	2	2	2
206	08.12.2022	7	1	2	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	3	2	3	2	2	2	3	2	2	2	2	2
207	08.12.2022	8	1	3	1	3	4	2	4	3	2	2	2	1	2	2	2	2	3	3	4	2	4	3	2	2	2	1	2	2	2	2	3
208	08.12.2022	9	1	3	0	3	4	2	4	2	2	3	3	1	2	1	2	2	2	3	4	3	4	3	2	3	3	1	2	1	2	2	2
209	08.12.2022	10	1	3	0	5	5	4	4	4	3	3	5	3	3	3	3	4	3	5	5	5	5	5	5	5	5	5	5	5	5	5	5
210	08.12.2022	11	3	7	0	3	2	3	4	1	4	3	2	1	1	2	2	1	2	3	2	3	4	3	4	3	2	2	2	2	2	2	2
211	08.12.2022	12	1	1	0	3		5	5	2	2	2	3	2	1	5	4	2	4	3		5	5	2	2	2	3	3	1	5	4	2	4
212	08.12.2022	13	1	3	0																												
213	08.12.2022	14	1	3	0	5	2	1	3	1	2	3	1	1	1	2	2	1	3	5	3	2	3	1	3	3	2	1	1	2	2	2	3
214	08.12.2022	15	2	4	0																												
215	08.12.2022	16	1	1	0	3	3	2	4	1	5	1	2	1	2	2	3	1	3	3	3	2	4	2	5	1	3	1	3	2	3	2	3

216	08.12.2022	17	1	1	1	3	3	3	3	3	3	3	3	3	3	3	3	3	3	5	5	5	5	5	5	5	5	5	5	5	5	5	5
217	08.12.2022	18	1	2	1	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
218	08.12.2022	19	1		1			1	1	1	1	1	1	1	1	1	1	1	1			2	2	2	2	2	2	2	2	2	2	2	2
219	08.12.2022	20	1	3	0	1	2	1	1	1	2	1	1	1	1	1	1	1	1	3	2	2	2	2	2	2	2	2	2	3	2	2	2
220	16.01.2023	1	1	2	0	1	5	2	1	1	2	1	1	1	2	1	2	2	1	3	5	3	2	3	3	3	3	2	3	3	3	4	4
221	16.01.2023	2	1	3	0	4	3	4	4	2	2	2	2	1	2	3	4	3	4	4	3	4	4	2	2	2	2	2	3	3	4	3	4
222	16.01.2023	3	1	3	0	4	4	4	3	3	2	3	3	3	3	3	3	2	3	4	4	4	3	3	2	3	3	3	3	3	3	2	3
223	16.01.2023	4	1	1	0	3	2	1	3	3	3	2	1	1	2	1	1	1	2	4	4	2	4	4	3	2	2	1	2	2	1	3	2
224	16.01.2023	5	1	2	0	3	3	1	2	1	3	2	2	2	1	2	1	1	2	3	3	1	2	1	3	2	2	2	1	2	1	1	2
225	16.01.2023	6	1	3	0	3	3	2	3	3	3	3	3	2	2	3	3	3	2	3	3	3	3	3	3	3	3	3	2	3	3	3	2
226	16.01.2023	7	2	4	0	3	3	1	2	1	4	3	3	2	1	2	2	2	2	3	3	1	2	1	4	3	3	2	1	2	2	2	2
227	16.01.2023	8	1	2	0	1	1	2	1	2	1	1	2	1	1	1	1	2	1	2	3	2	2		2	2	2	2	2	2	1	2	1
228	16.01.2023	9	1	3	0	4	4	4	4	3	4	3	4	4	4	4	3	4	2	4	4	4	4	3	4	3	4	4	4	4	3	4	2
229	16.01.2023	10	1	2	0	2	2	2	3	2	3	4	2	2	2	2	2	2	2	3	3	3	3	3	3	4	3	3	3	3	3	3	3
230	16.01.2023	11	1	1	0	1	1	2	2	2	2	2	2	2	2	2	2	2	2	3	3	3	3	3	3	3	3	3	3	3	3	3	3
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232	17.01.2023	2	1	2	0	1	2	3	1	1	1	2	2	1	1	1	2	1	2	2	2	3	2	2	1	3	3	2	2	3	2	2	2
233	17.01.2023	3	1	2	0	2	3	4	4		5	4		3	4		4	4	4	5	5	5	4		5	5		4	5		5	4	4
234	17.01.2023	4	2	3	1	2	3	4	5	3	5	5	5	4	5	2	3	3	4	4	4	4	5	4	5	5	5	5	5	4	4	4	5
235	17.01.2023	5	1	3	1	4	3	3	3	2	2	3	2	3	1	3	3	2	2	4	4	3	4	4	4	5	4	5	4	5	4	5	5
236	17.01.2023	6	1	3	0	3	4	4	2	1	1	1	1	1	1	1	1	1	4	3	5	4	2	1	1	2	1	2	2	2	1	1	4
237	17.01.2023	7	1	1	0	1	1	1	2	1	1	1	1	1	1	1	1	1	1	3	3	2	3	2	2	2	2	2	2	2	2	2	2
238	17.01.2023	8	2	3	0	3	3	3	3	3	3	3	1	1	1	1	1	2	2	4	4	4	3	4	3	3	3	3	3	3	3	3	3
239	17.01.2023	9	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	1	1	1	1	1	1	1	1	1	1	1
240	17.01.2023	10	1	3	0	2	2	2	2	2	2	2	2	2	2	2	2	2	2	3	3	2	3	3	2	2	2	2	3	2	2	2	2
241	17.01.2023	11	1	3	0	3	3	2	3	1	3	2	2	1	1	1	1	1	1	3	3	2	3	1	3	2	1	1	2	1	1	1	1
242	17.01.2023	12	1	3	0	2	3	2	4	2	3	2	2	1	1	1	2	1	2	3	3	3	4	2	3	2	2	1	1	1	2	1	2
243	17.01.2023	13	1	1	0	1	1	1	1	1	2	1	2	2	1	2	1	2	2	2	2	1	2	2	3	2	2	2	2	2	2	2	3
244	25.01.2023	1	2	4	0	4	3	3	4	2	3	4	3	3	2	4	4	4	4	4	3	3	4	2	3	4	3	3	2	4	4	4	4
245	25.01.2023	2	2	5	1	5	5	5	5	3	3	4	3	3	3	4	3	4	3	5	5	5	5	4	3	4	4	3	4	4	3	4	3
246	25.01.2023	3	1	4	0	4	4	1	4		3	3	3	4	3	3	3	3	3	4	4	1	4		3	3	3	4	4	4	3	3	3

247	25.01.2023	4	2	5	0	4	4	3	3	2	2	3	3	2	2	3	3	3	3	4	4	3	4	3	3	3	4	3	3	3	3	4	3
248	25.01.2023	5	2	4	0	3	3	3	3	2	3	2	3	4	3	3	3	3	3	3	3	3	3	2	3	3	3	4	4	3	3	3	3
249	25.01.2023	6	1	4	0	3	4	2	4	4	4	3	2	2	2	2	3	2	4	3	4	2	4	4	4	3	2	2	2	2	3	2	4
250	25.01.2023	7	1	4	0	4	4	5	5	3	4	4	2		1	4	3	3	3	4	4	5	5	3	4	4	2		1	4	3	3	3
251	25.01.2023	8	5	8	1	5	5	4	5	4	4	4	5	5	4	4	4	5	4	5	5	4	5	4	4	4	5	5	4	4	4	5	4
252	25.01.2023	9	1	1	0	3	3	3	2	1	3	2	1	1	1	1	1	2	2	4	3	3	3	2	3	3	2	1	1	1	1	2	2
253	25.01.2023	10	2	4	1	4	3	2	5	2	3	2	3	3	2	2	3	2	3	5	4	2	5	3	3	3	3	3	4	2	3	3	3
254	25.01.2023	11	2	6	0	5	5	3	5	2	2	4	4	4	4	5	3	3	4	5	5	3	5	2	2	4	4	4	4	5	3	3	4
255	25.01.2023	12	2	5	0	3	4	3	4	4	4	3	4	4	3	3	2	3	2	4	4	3	4	4	4	3	4	4	3	3	2	3	2
256	25.01.2023	13	2	4	1	4	4	4	4	3	4	4	3	3	3	4	4	4	3	4	4	4	4	3	4	4	3	3	3	4	4	4	3
257	25.01.2023	14	2	4	0	3	3	2	1	1	2	1	2	2	1	2	3	3	3	3	3	2	2	2	2	2	3	2	1	3	3	3	3
258	25.01.2023	15	2	4	0	4	3	3	4	1	4	2	2	1		2	3	3	3	4	4	3	4	2	4	3	3	1		3	3	3	3
259	25.01.2023	16	1	3	0	4	4	2	4	3	3	3	3	4	2	4	4	4	3	4	4	3	4	3	3	3	3	4	2	4	4	4	3
260	25.01.2023	17	1	4	0	3	3	2	4	2	3	2	3	2	3	2	4	2	3	3	3	2	4	2	4	2	4	2	4	3	4	2	3

Time	Pre	Post
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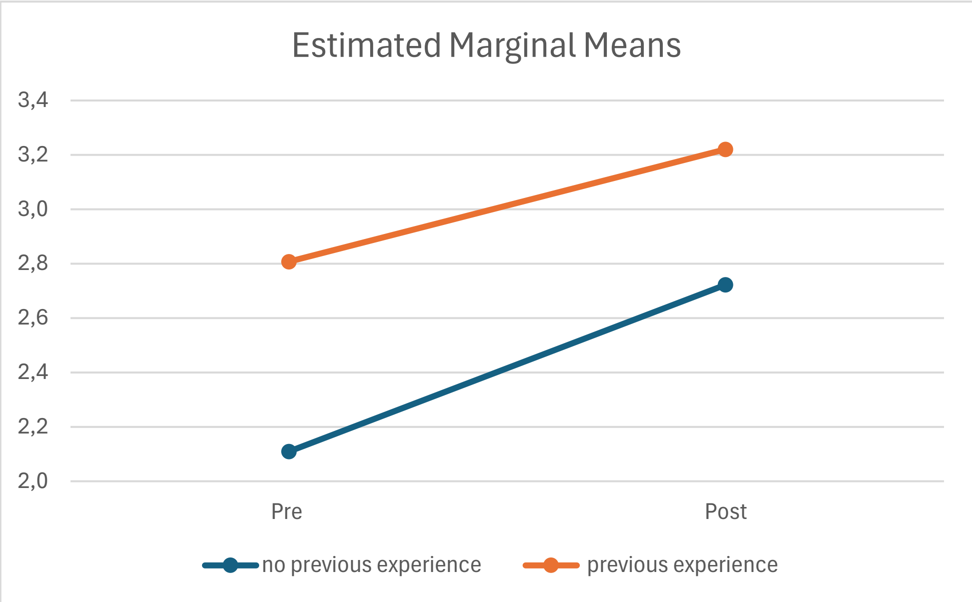
previous experience	2,8075	3,2205



Time	Pre	Post
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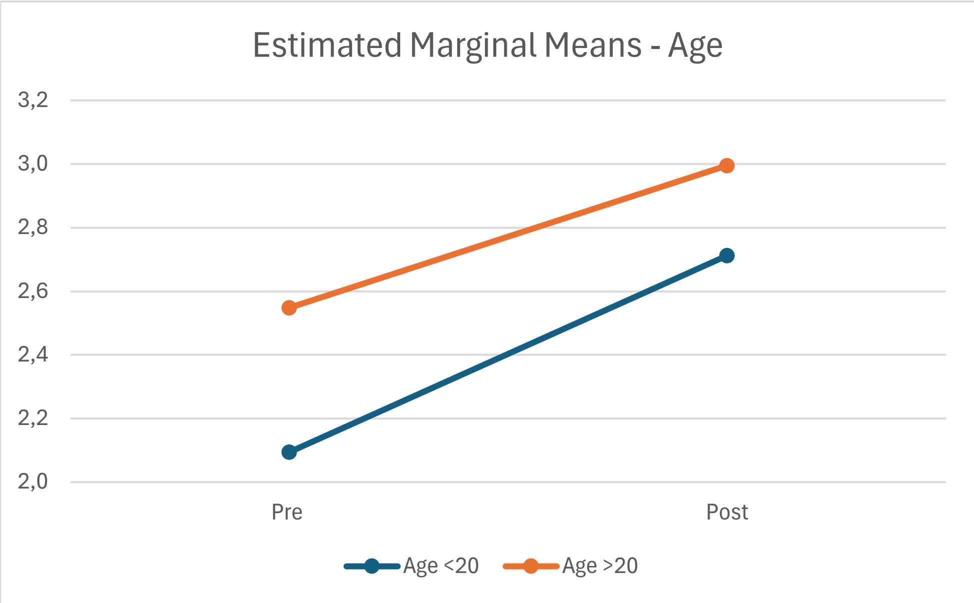
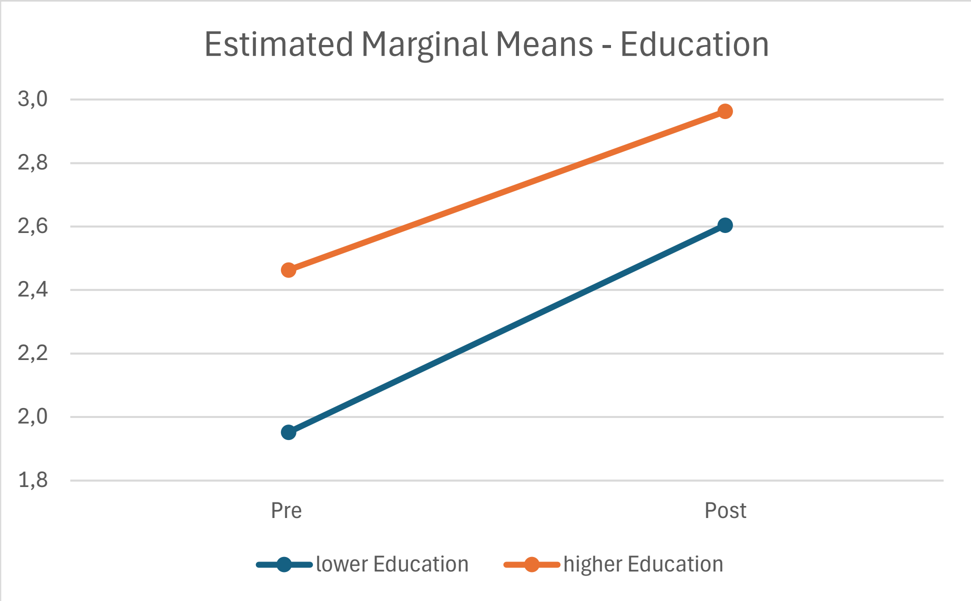
Age >20	2,5482	2,9954



Time	Pre	Post
lower Educati	1,9524	2,6043
higher Educat	2,4632	2,9623



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EXAMINE VARIABLES=ALL_pre ALL_post BY Experience
 /PLOT NPPLOT
 /STATISTICS DESCRIPTIVES
 /CINTERVAL 95
 /MISSING LISTWISE
 /NOTOTAL.
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Prüfung Normalverteilung Experience, Age2, Edu2

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EXAMINE VARIABLES=ALL_pre ALL_post BY Experience
/PLOT NPPLOT
/STATISTICS DESCRIPTIVES
/CINTERVAL 95
/MISSING LISTWISE
/NOTOTAL.
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Explorative Datenanalyse

Hinweise

Ausgabe erstellt		25-MAR-2025 12:27:17
Kommentare		
Eingabe	Daten	/Users/janschlueter/sciebo - Schlüter, Jan Steffen (j23s00908@hs-bochum.de)@hs-bochum.sciebo.de/Paper Digitalkompetenzen mit HRW Hellwig/Fragebogenauswertung_DIE-Impact-bereinigt.sav
	Aktiver Datensatz	DataSet1
	Filter	<keine>
	Gewichtung	<keine>
	Aufgeteilte Datei	<keine>
	Anzahl der Zeilen in der Arbeitsdatei	242
Behandlung fehlender Werte	Definition von Fehlend	Benutzerdefinierte fehlende Werte für abhängige Variablen werden als fehlend behandelt.
	Verwendete Fälle	Statistiken basieren auf Fällen, die bei keinen Variablen oder Faktoren fehlende Werte aufweisen.

Hinweise

Syntax		EXAMINE VARIABLES=ALL_pre ALL_post BY Experience /PLOT NPPLOT /STATISTICS DESCRIPTIVES /CINTERVAL 95 /MISSING LISTWISE /NOTOTAL.
Ressourcen	Prozessorzeit	00:00:01,45
	Verstrichene Zeit	00:00:02,00

Experience

Verarbeitete Fälle

		Fälle					
		Gültig		Fehlend		Gesamt	
	Experience	N	Prozent	N	Prozent	N	Prozent
ALL_pre	keine Erfahrung	215	100,0%	0	0,0%	215	100,0%
	Vorerfahrung	25	100,0%	0	0,0%	25	100,0%
ALL_post	keine Erfahrung	215	100,0%	0	0,0%	215	100,0%
	Vorerfahrung	25	100,0%	0	0,0%	25	100,0%

Deskriptive Statistik

	Experience			Statistik	Standard Fehler
ALL_pre	keine Erfahrung	Mittelwert		2,1283	,05070
		95% Konfidenzintervall des Mittelwerts	Untergrenze	2,0284	
			Obergrenze	2,2282	
		5% getrimmtes Mittel		2,0980	
		Median		2,0714	
		Varianz		,553	
		Standard Abweichung		,74348	
		Minimum		1,00	
		Maximum		4,71	
		Spannweite		3,71	
		Interquartilbereich		1,07	
		Schiefe		,507	,166
		Kurtosis		-,141	,330
	Vorerfahrung	Mittelwert		2,8800	,17132
		95% Konfidenzintervall des Mittelwerts	Untergrenze	2,5264	
			Obergrenze	3,2336	
		5% getrimmtes Mittel		2,8960	
		Median		2,7857	
		Varianz		,734	
		Standard Abweichung		,85658	
		Minimum		1,00	
		Maximum		4,43	
		Spannweite		3,43	
		Interquartilbereich		1,54	
		Schiefe		-,173	,464
		Kurtosis		-,607	,902
ALL_post	keine Erfahrung	Mittelwert		2,7527	,05351
		95% Konfidenzintervall des Mittelwerts	Untergrenze	2,6472	
			Obergrenze	2,8582	
		5% getrimmtes Mittel		2,7365	
		Median		2,7857	
		Varianz		,616	
		Standard Abweichung		,78466	
		Minimum		1,00	
		Maximum		5,00	
		Spannweite		4,00	
		Interquartilbereich		1,00	
		Schiefe		,265	,166

Deskriptive Statistik

Experience				Statistik	Standard Fehler
		Kurtosis		,241	,330
	Vorerfahrung	Mittelwert		3,3400	,16728
		95% Konfidenzintervall des Mittelwerts	Untergrenze	2,9948	
			Obergrenze	3,6852	
		5% getrimmtes Mittel		3,3278	
		Median		3,1429	
		Varianz		,700	
		Standard Abweichung		,83638	
		Minimum		2,00	
		Maximum		5,00	
		Spannweite		3,00	
		Interquartilbereich		1,14	
		Schiefe		,053	,464
		Kurtosis		-,815	,902

Tests auf Normalverteilung

		Kolmogorov-Smirnov[a]			Shapiro-Wilk	
	Experience	Statistik	df	Signifikanz	Statistik	df
ALL_pre	keine Erfahrung	,066	215	,023	,966	215
	Vorerfahrung	,133	25	,200*	,967	25
ALL_post	keine Erfahrung	,056	215	,096	,984	215
	Vorerfahrung	,113	25	,200*	,961	25

Tests auf Normalverteilung

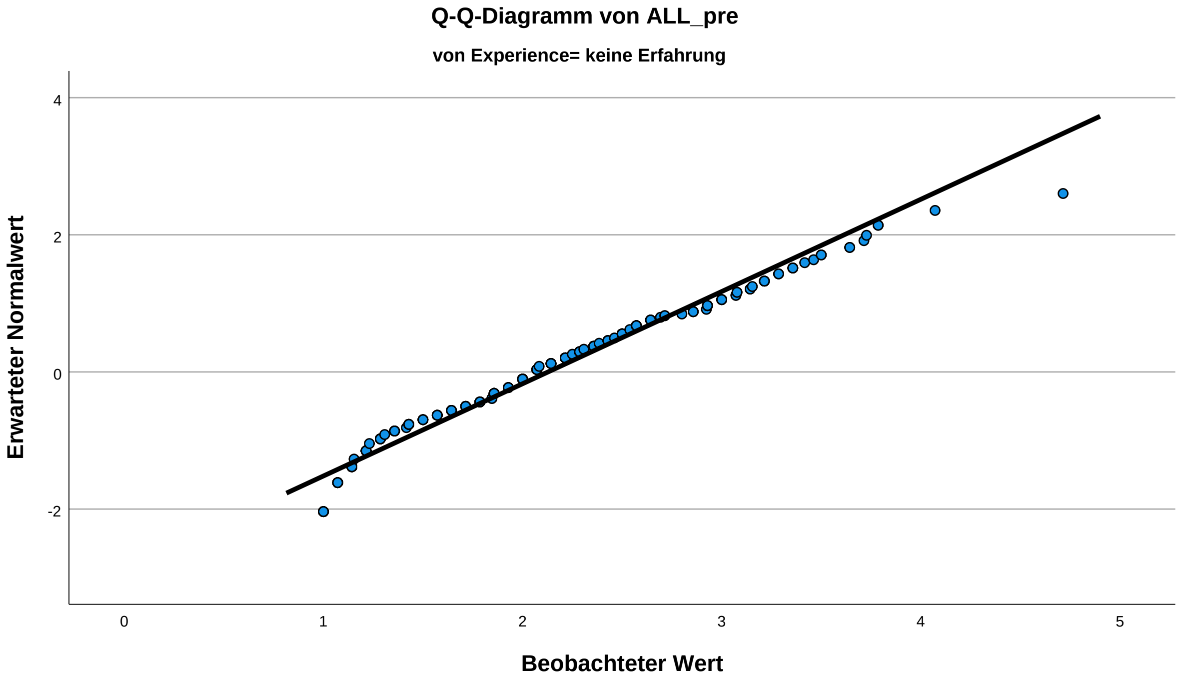
		Shapiro-Wilk
	Experience	Signifikanz
ALL_pre	keine Erfahrung	,000
	Vorerfahrung	,581
ALL_post	keine Erfahrung	,017
	Vorerfahrung	,437

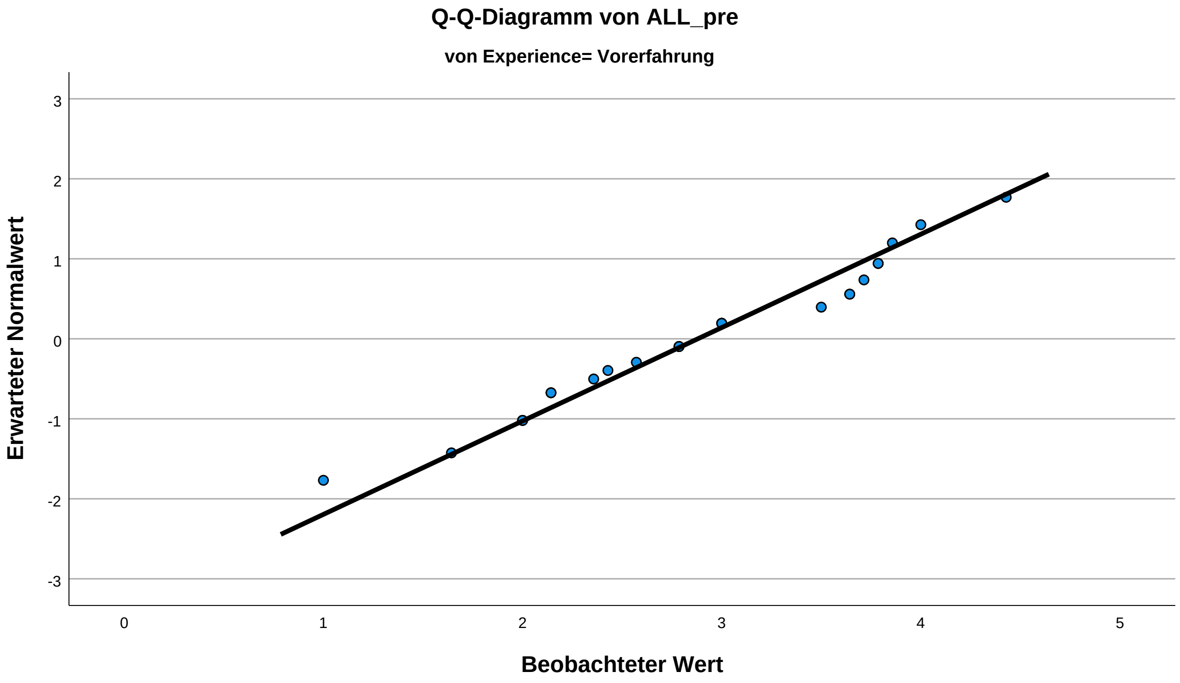
*. Dies ist eine untere Grenze der echten Signifikanz.

a. Signifikanzkorrektur nach Lilliefors

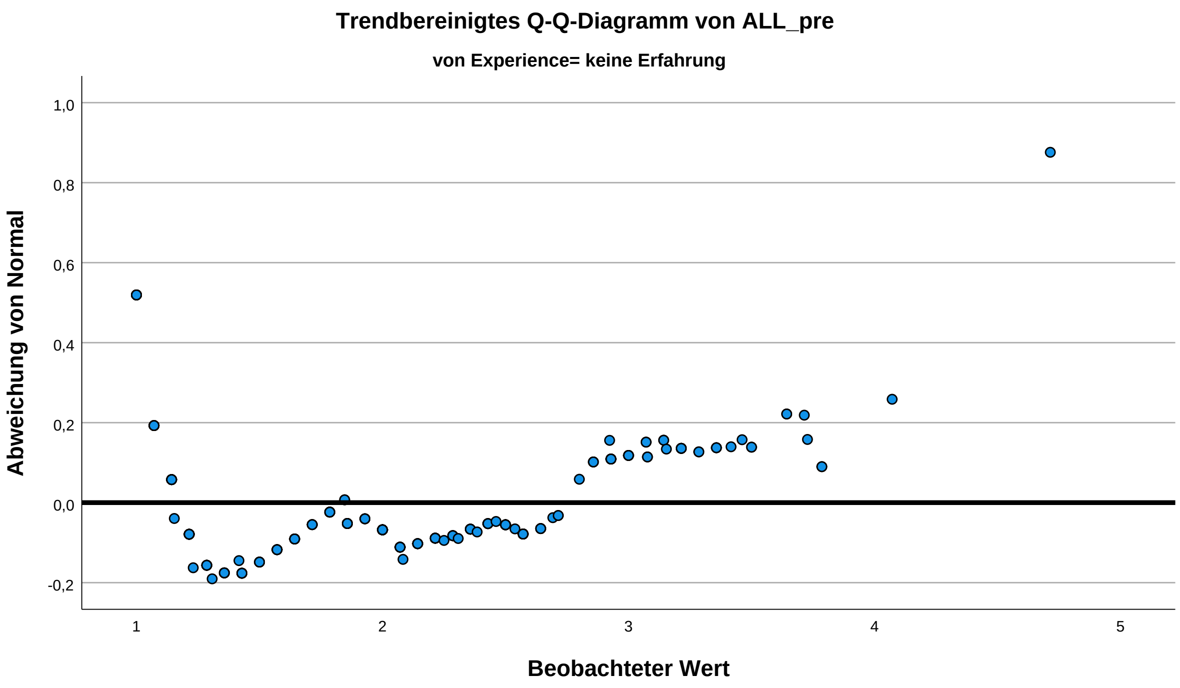
ALL_pre

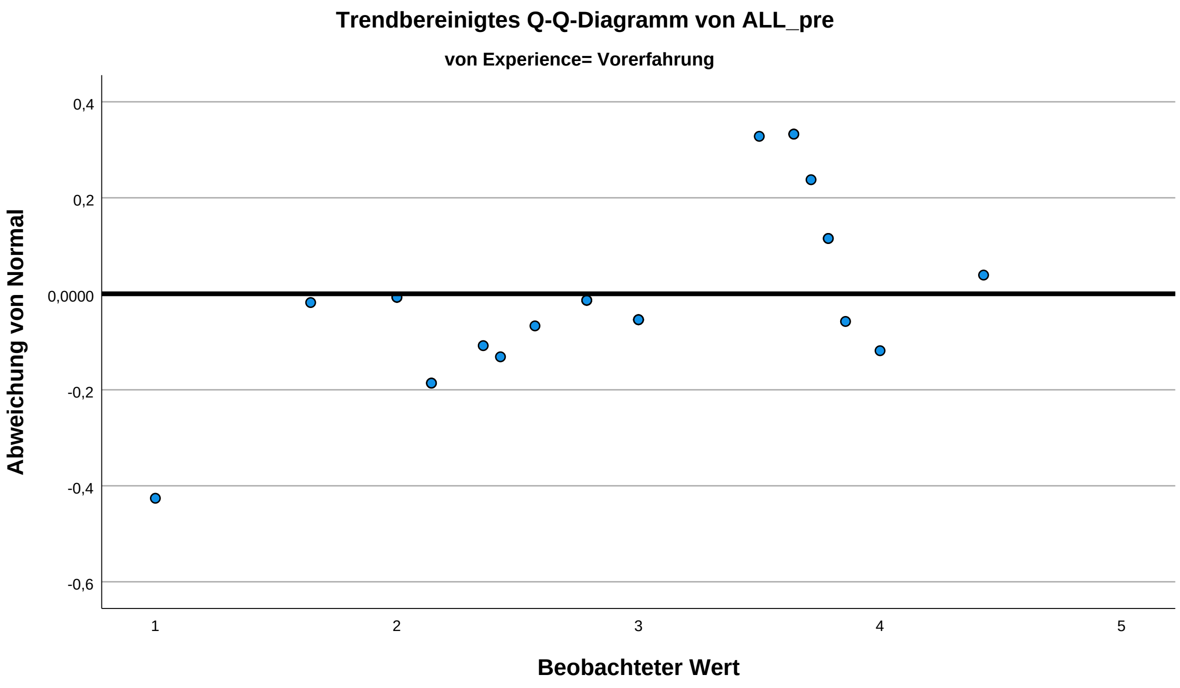
Normalverteilote Q-Q-Diagramme





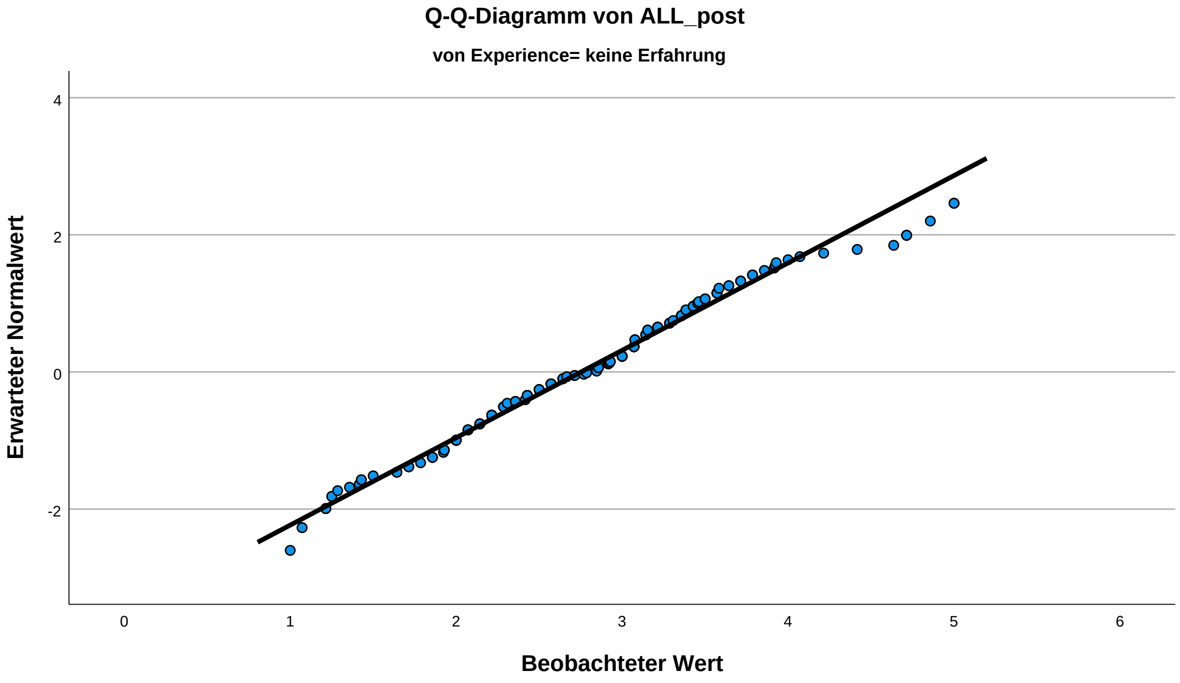
Trendbereinigte normalverteilte Q-Q-Diagramme

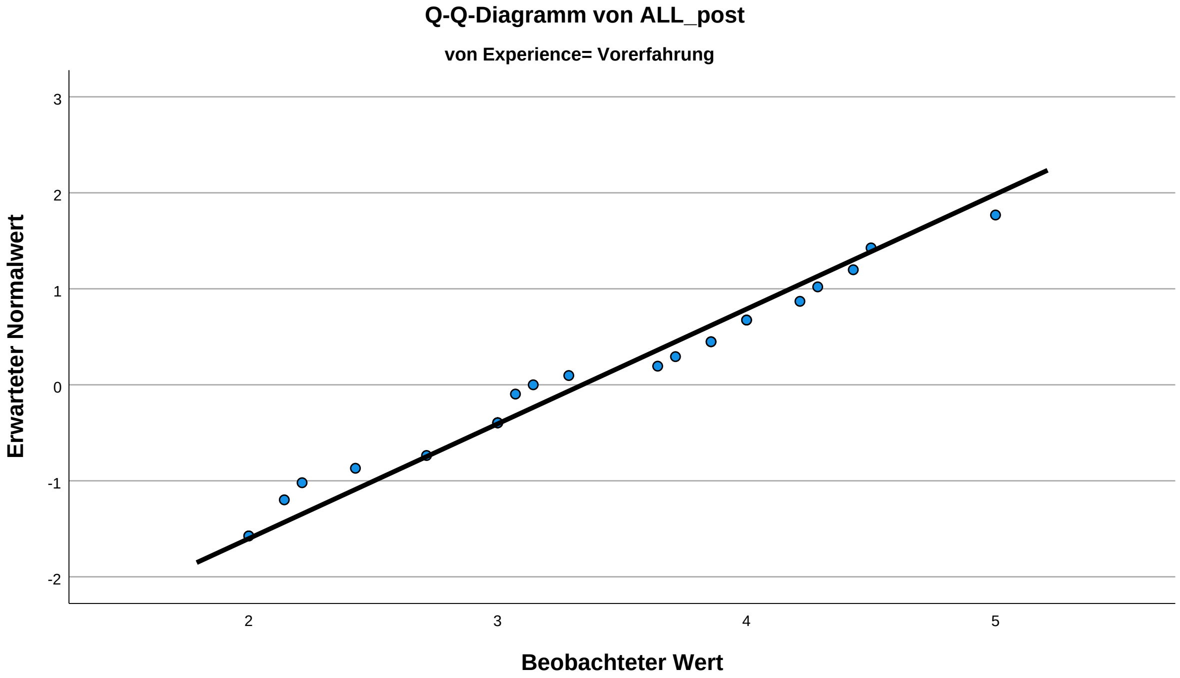




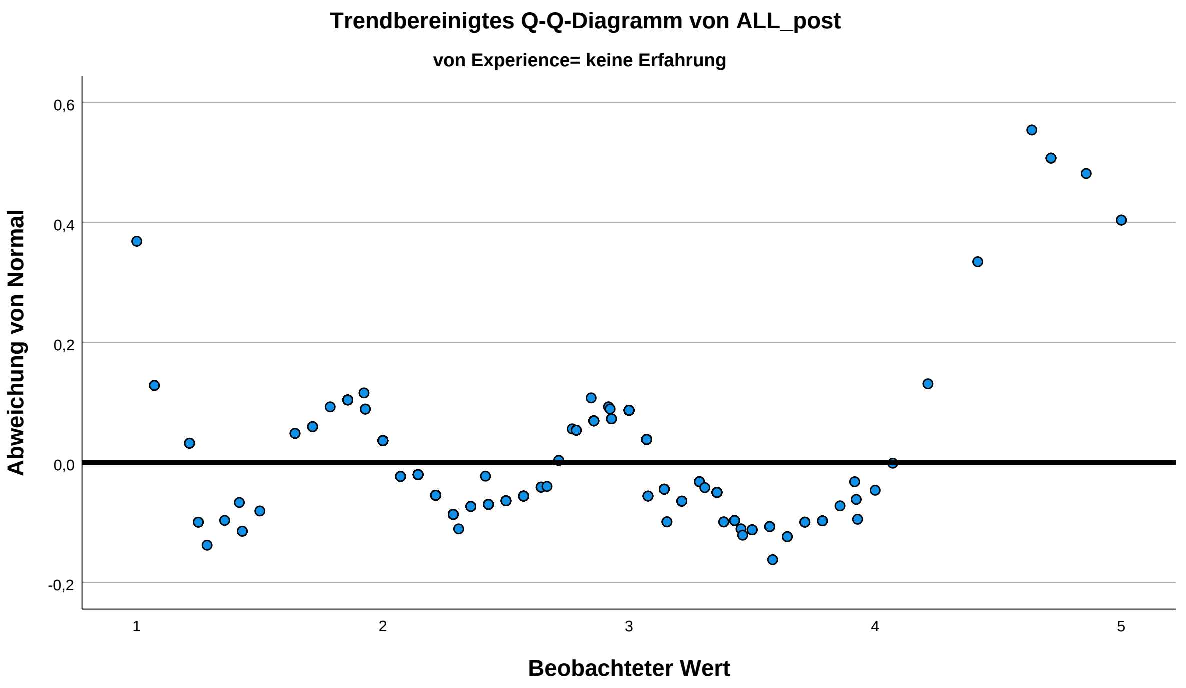
ALL_post

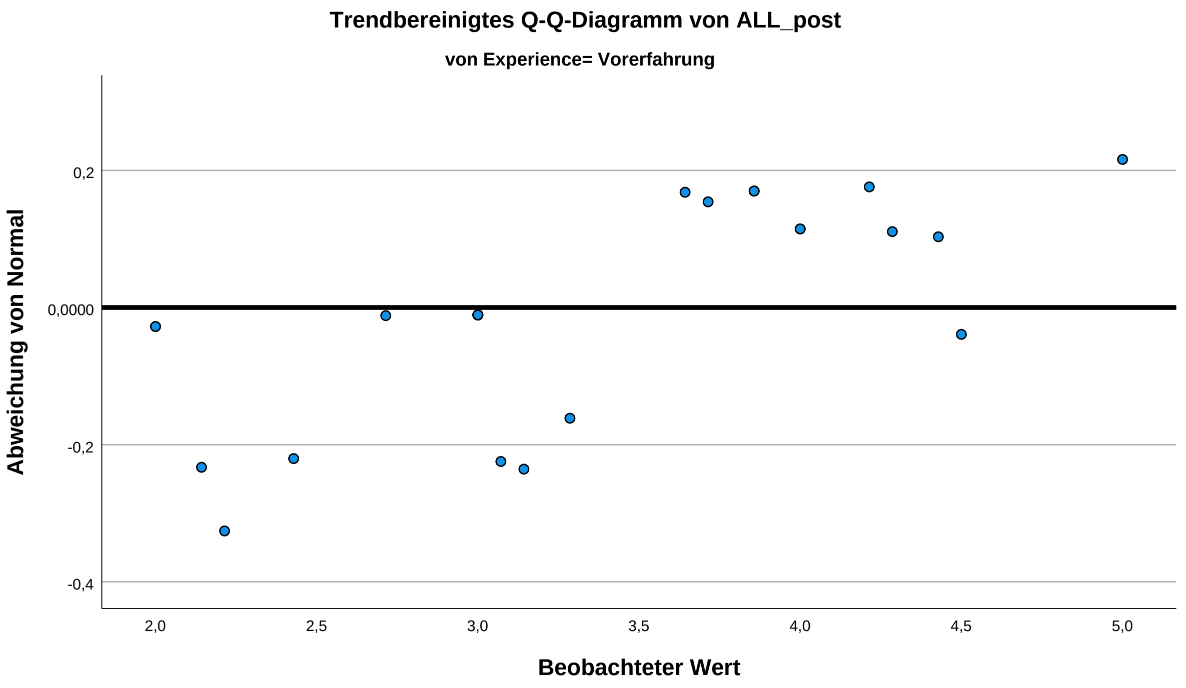
Normalverteilote Q-Q-Diagramme





Trendbereinigte normalverteilte Q-Q-Diagramme



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/STATISTICS DESCRIPTIVES
/CINTERVAL 95
/MISSING LISTWISE
/NOTOTAL.
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Explorative Datenanalyse

Hinweise

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Kommentare		
Eingabe	Daten	/Users/janschlueter/sciebo - Schlüter, Jan Steffen (j23s00908@hs-bochum.de)@hs-bochum.sciebo.de/Paper Digitalkompetenzen mit HRW Hellwig/Fragebogenauswertung_DIE-Impact-bereinigt.sav
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	Filter	<keine>
	Gewichtung	<keine>
	Aufgeteilte Datei	<keine>
	Anzahl der Zeilen in der Arbeitsdatei	242
Behandlung fehlender Werte	Definition von Fehlend	Benutzerdefinierte fehlende Werte für abhängige Variablen werden als fehlend behandelt.
	Verwendete Fälle	Statistiken basieren auf Fällen, die bei keinen Variablen oder Faktoren fehlende Werte aufweisen.
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Ressourcen	Prozessorzeit	00:00:01,11
	Verstrichene Zeit	00:00:01,00

AGE2

Verarbeitete Fälle

	AGE2	Fälle Gültig N	Gültig Prozent	Fehlend N	Fehlend Prozent	Gesamt N	Gesamt Prozent
ALL_pre	<20	196	100,0%	0	0,0%	196	100,0%
	>20	46	100,0%	0	0,0%	46	100,0%
ALL_post	<20	196	100,0%	0	0,0%	196	100,0%
	>20	46	100,0%	0	0,0%	46	100,0%

Deskriptive Statistik

	AGE2			Statistik	Standard Fehler
ALL_pre	<20	Mittelwert		2,1067	,05265
		95% Konfidenzintervall des Mittelwerts	Untergrenze	2,0028	
			Obergrenze	2,2105	
		5% getrimmtes Mittel		2,0758	
		Median		2,0000	
		Varianz		,543	
		Standard Abweichung		,73706	
		Minimum		1,00	
		Maximum		4,07	
		Spannweite		3,07	
		Interquartilbereich		1,07	
		Schiefe		,455	,174
		Kurtosis		-,422	,346
	>20	Mittelwert		2,6361	,12472
		95% Konfidenzintervall des Mittelwerts	Untergrenze	2,3849	
			Obergrenze	2,8874	
		5% getrimmtes Mittel		2,6175	
		Median		2,5357	
		Varianz		,716	
		Standard Abweichung		,84591	
		Minimum		1,00	
		Maximum		4,71	
		Spannweite		3,71	
		Interquartilbereich		1,23	
		Schiefe		,336	,350
		Kurtosis		-,296	,688
ALL_post	<20	Mittelwert		2,7472	,05750
		95% Konfidenzintervall des Mittelwerts	Untergrenze	2,6338	
			Obergrenze	2,8605	

Deskriptive Statistik

AGE2				Statistik	Standard Fehler
		5% getrimmtes Mittel		2,7255	
		Median		2,7857	
		Varianz		,648	
		Standard Abweichung		,80497	
		Minimum		1,00	
		Maximum		5,00	
		Spannweite		4,00	
		Interquartilbereich		1,01	
		Schiefe		,379	,174
		Kurtosis		,244	,346
	>20	Mittelwert		3,0639	,11579
		95% Konfidenzintervall des Mittelwerts	Untergrenze	2,8307	
			Obergrenze	3,2971	
		5% getrimmtes Mittel		3,0758	
		Median		3,0769	
		Varianz		,617	
		Standard Abweichung		,78530	
		Minimum		1,21	
		Maximum		4,71	
		Spannweite		3,50	
		Interquartilbereich		1,14	
		Schiefe		-,117	,350
		Kurtosis		,117	,688

Tests auf Normalverteilung

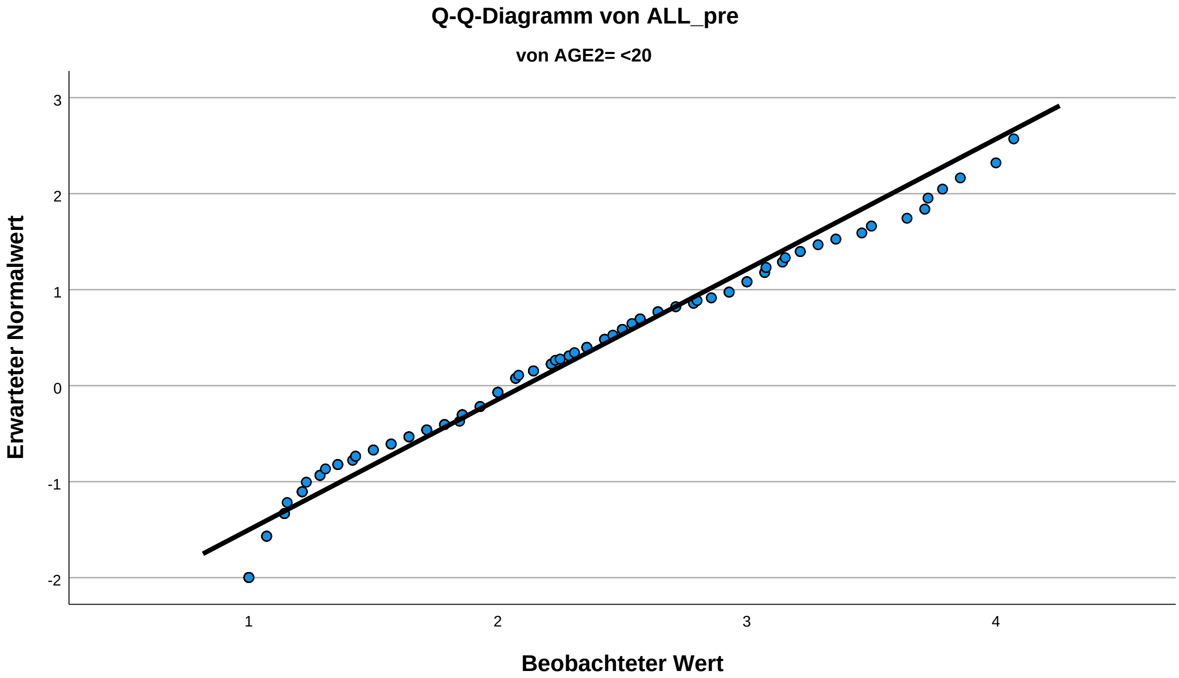
		Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	AGE2	Statistik	df	Signifikanz	Statistik	df	Signifikanz
ALL_pre	<20	,078	196	,006	,964	196	,000
	>20	,096	46	,200*	,980	46	,605
ALL_post	<20	,067	196	,033	,982	196	,012
	>20	,098	46	,200*	,980	46	,590

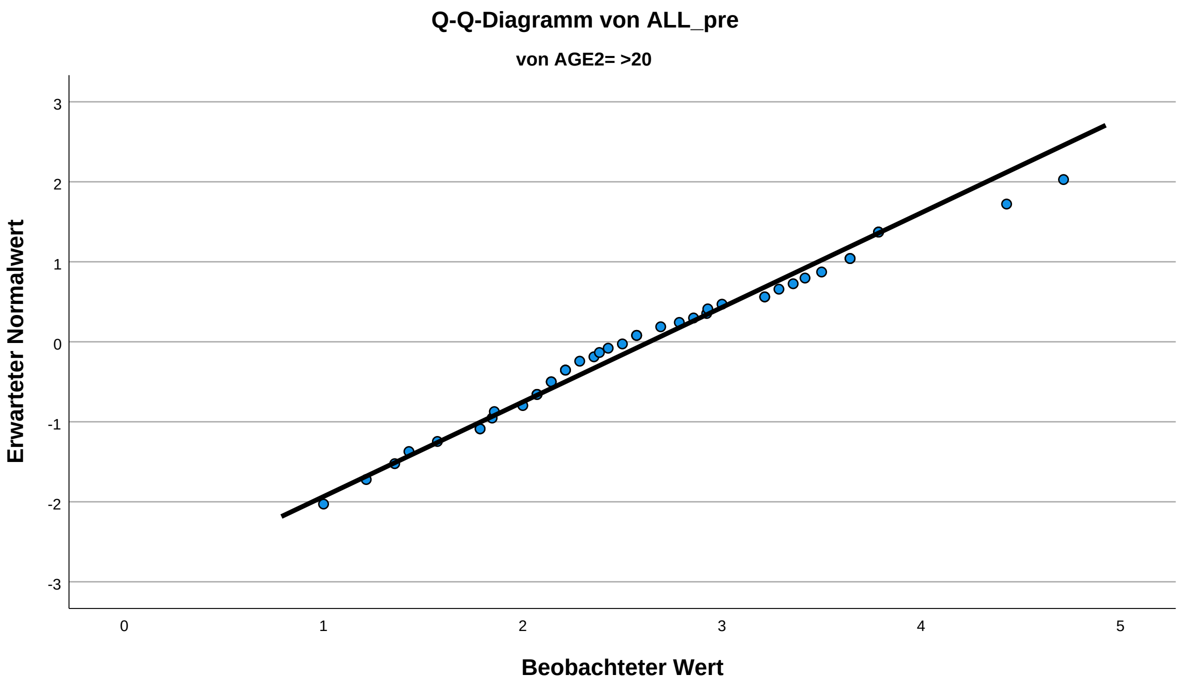
*. Dies ist eine untere Grenze der echten Signifikanz.

a. Signifikanzkorrektur nach Lilliefors

ALL_pre

Normalverteilote Q-Q-Diagramme

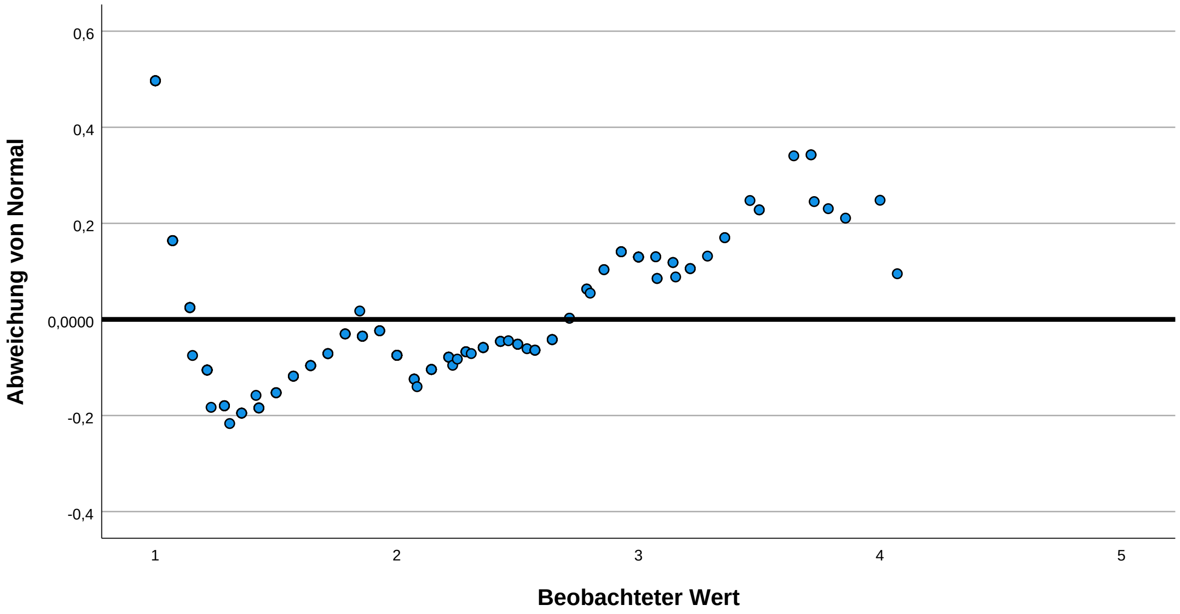




Trendbereinigte normalverteilte Q-Q-Diagramme

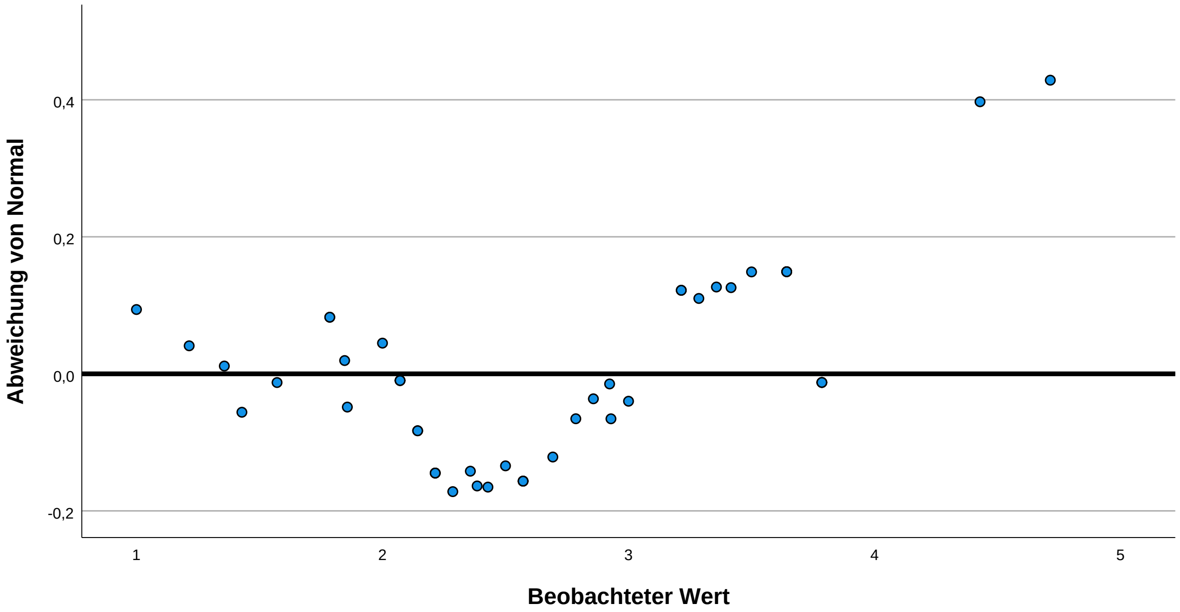
Trendbereinigtes Q-Q-Diagramm von ALL_pre

von AGE2= <20



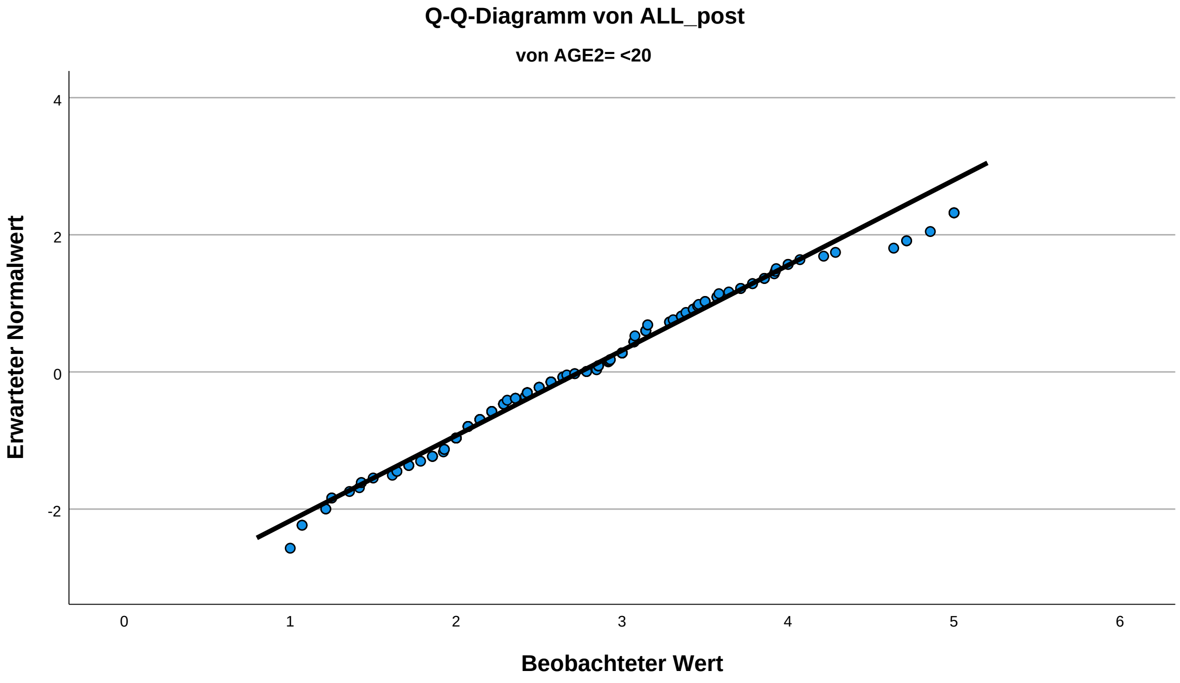
Trendbereinigtes Q-Q-Diagramm von ALL_pre

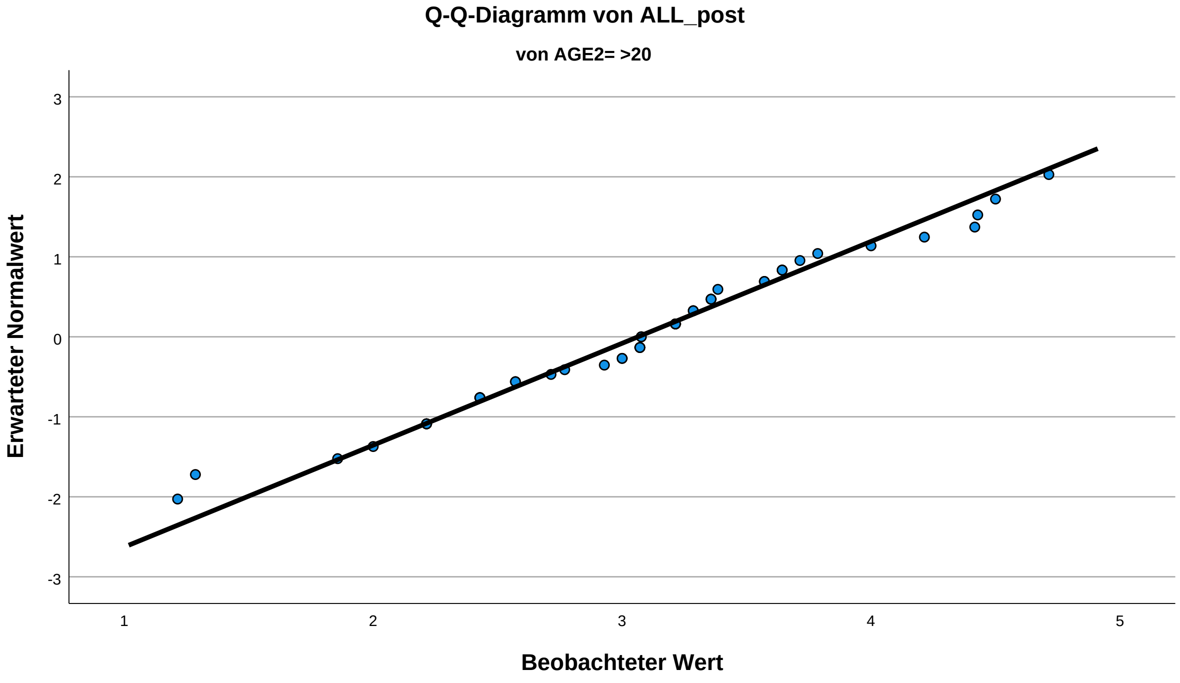
von AGE2= >20



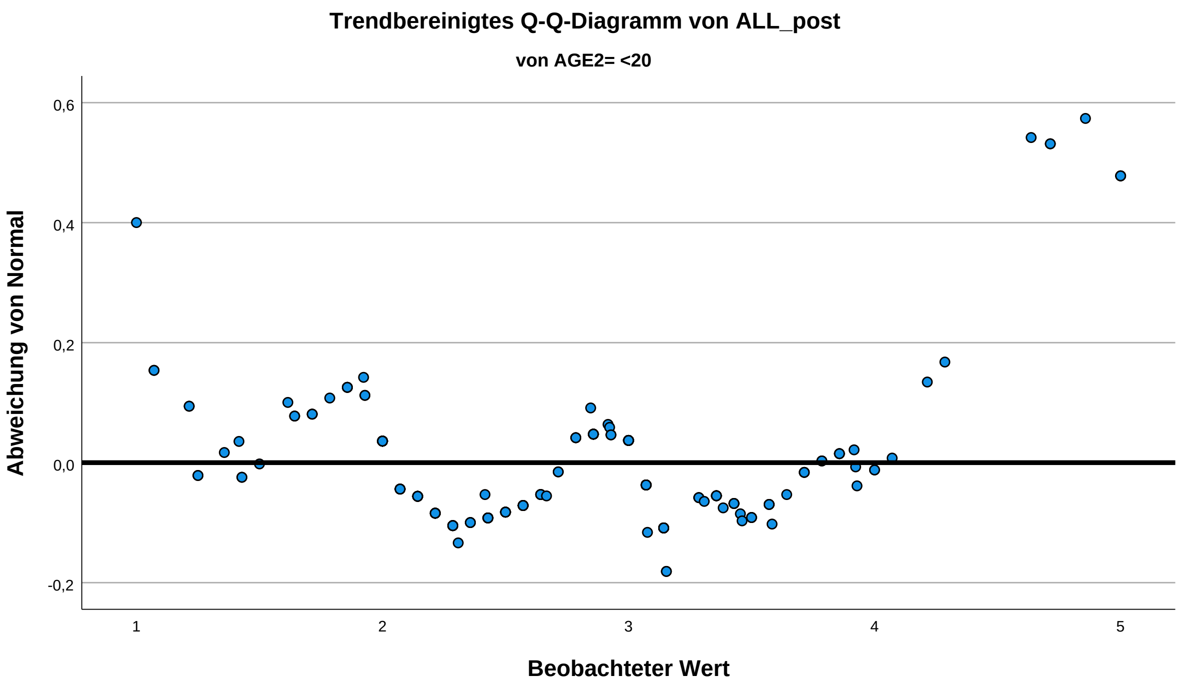
ALL_post

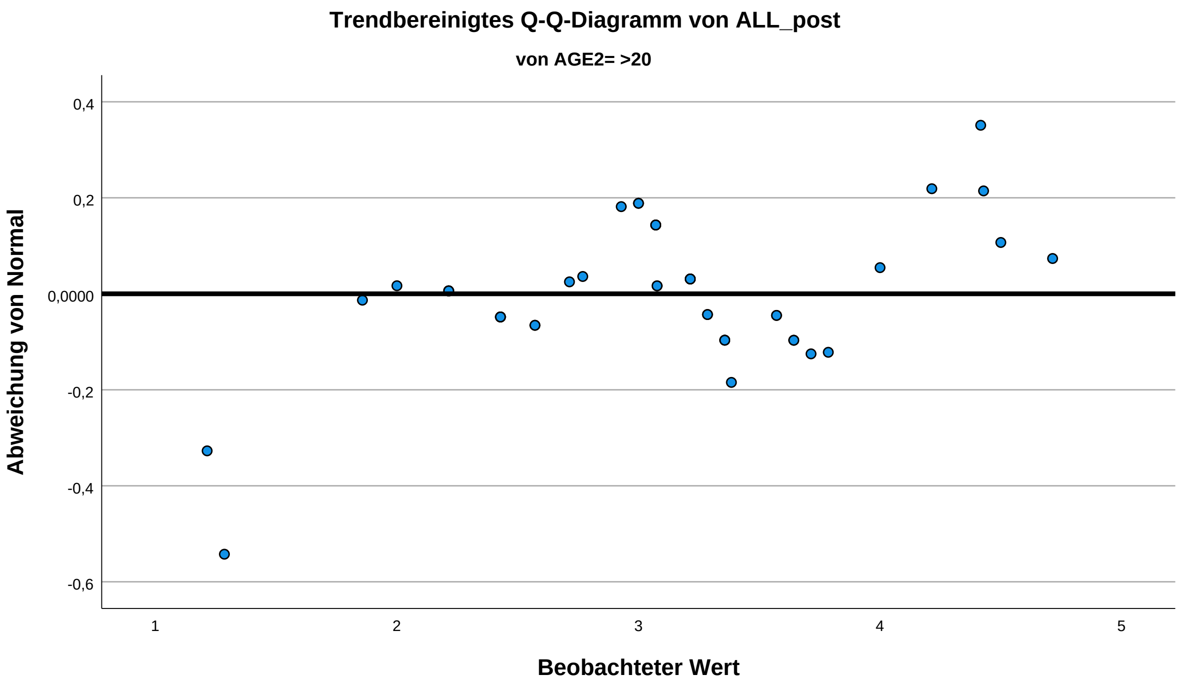
Normalverteilote Q-Q-Diagramme





Trendbereinigte normalverteilte Q-Q-Diagramme



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/STATISTICS DESCRIPTIVES
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Explorative Datenanalyse

Hinweise

Ausgabe erstellt		25-MAR-2025 12:27:47
Kommentare		
Eingabe	Daten	/Users/janschlueter/sciebo - Schlüter, Jan Steffen (j23s00908@hs-bochum.de)@hs-bochum.sciebo.de/Paper Digitalkompetenzen mit HRW Hellwig/Fragebogenauswertung_DIE-Impact-bereinigt.sav
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	Filter	<keine>
	Gewichtung	<keine>
	Aufgeteilte Datei	<keine>
	Anzahl der Zeilen in der Arbeitsdatei	242
Behandlung fehlender Werte	Definition von Fehlend	Benutzerdefinierte fehlende Werte für abhängige Variablen werden als fehlend behandelt.
	Verwendete Fälle	Statistiken basieren auf Fällen, die bei keinen Variablen oder Faktoren fehlende Werte aufweisen.
Syntax		EXAMINE VARIABLES=ALL_pre ALL_post BY Edu2 /PLOT NPPLOT /STATISTICS DESCRIPTIVES /CINTERVAL 95 /MISSING LISTWISE /NOTOTAL.
Ressourcen	Prozessorzeit	00:00:02,21
	Verstrichene Zeit	00:00:03,00

Edu2

Verarbeitete Fälle

		Fälle				
		Gültig		Fehlend		Gesamt
	Edu2	N	Prozent	N	Prozent	N
ALL_pre	kein Abschluss	53	100,0%	0	0,0%	53
	Hauptschulabschluss	67	100,0%	0	0,0%	67
	Mittlere Reife	84	100,0%	0	0,0%	84
	Abitur und höher (Studium, Ausbildung, Promotion)	36	100,0%	0	0,0%	36
ALL_post	kein Abschluss	53	100,0%	0	0,0%	53
	Hauptschulabschluss	67	100,0%	0	0,0%	67
	Mittlere Reife	84	100,0%	0	0,0%	84
	Abitur und höher (Studium, Ausbildung, Promotion)	36	100,0%	0	0,0%	36

Verarbeitete Fälle

		Fälle
		Gesamt
	Edu2	Prozent
ALL_pre	kein Abschluss	100,0%
	Hauptschulabschluss	100,0%
	Mittlere Reife	100,0%
	Abitur und höher (Studium, Ausbildung, Promotion)	100,0%
ALL_post	kein Abschluss	100,0%
	Hauptschulabschluss	100,0%
	Mittlere Reife	100,0%
	Abitur und höher (Studium, Ausbildung, Promotion)	100,0%

Deskriptive Statistik

	Edu2			Statistik
ALL_pre	kein Abschluss	Mittelwert		1,9473
		95% Konfidenzintervall des Mittelwerts	Untergrenze	1,7487
			Obergrenze	2,1459
		5% getrimmtes Mittel		1,9064
		Median		2,0000
		Varianz		,519
		Standard Abweichung		,72059
		Minimum		1,00
		Maximum		4,07
		Spannweite		3,07
		Interquartilbereich		1,11
		Schiefe		,697
		Kurtosis		,180
	Hauptschulabschluss	Mittelwert		1,8846
		95% Konfidenzintervall des Mittelwerts	Untergrenze	1,7285
			Obergrenze	2,0408
		5% getrimmtes Mittel		1,8546
		Median		1,7857
		Varianz		,410
		Standard Abweichung		,64030
		Minimum		1,00
		Maximum		3,73
		Spannweite		2,73
		Interquartilbereich		1,02
		Schiefe		,608
		Kurtosis		-,276
	Mittlere Reife	Mittelwert		2,3837
		95% Konfidenzintervall des Mittelwerts	Untergrenze	2,2285
			Obergrenze	2,5389
		5% getrimmtes Mittel		2,3766
		Median		2,2143
		Varianz		,511
		Standard Abweichung		,71504
		Minimum		1,00
		Maximum		4,00
		Spannweite		3,00
		Interquartilbereich		1,00
		Schiefe		,300

Deskriptive Statistik

	Edu2			Standard Fehler
ALL_pre	kein Abschluss	Mittelwert		,09898
		95% Konfidenzintervall des Mittelwerts	Untergrenze	
			Obergrenze	
		5% getrimmtes Mittel		
		Median		
		Varianz		
		Standard Abweichung		
		Minimum		
		Maximum		
		Spannweite		
		Interquartilbereich		
		Schiefe		,327
		Kurtosis		,644
	Hauptschulabschluss	Mittelwert		,07822
		95% Konfidenzintervall des Mittelwerts	Untergrenze	
			Obergrenze	
		5% getrimmtes Mittel		
		Median		
		Varianz		
		Standard Abweichung		
		Minimum		
		Maximum		
		Spannweite		
		Interquartilbereich		
		Schiefe		,293
		Kurtosis		,578
	Mittlere Reife	Mittelwert		,07802
		95% Konfidenzintervall des Mittelwerts	Untergrenze	
			Obergrenze	
		5% getrimmtes Mittel		
		Median		
		Varianz		
		Standard Abweichung		
		Minimum		
		Maximum		
		Spannweite		
		Interquartilbereich		
		Schiefe		,263

Deskriptive Statistik

	Edu2			Statistik
		Kurtosis		-,444
	Abitur und höher (Studium, Ausbildung, Promotion)	Mittelwert		2,8226
		95% Konfidenzintervall des Mittelwerts	Untergrenze	2,5443
			Obergrenze	3,1010
		5% getrimmtes Mittel		2,8123
		Median		2,8214
		Varianz		,677
		Standard Abweichung		,82272
		Minimum		1,15
		Maximum		4,71
		Spannweite		3,56
		Interquartilbereich		1,20
		Schiefe		,099
		Kurtosis		-,104
ALL_post	kein Abschluss	Mittelwert		2,5896
		95% Konfidenzintervall des Mittelwerts	Untergrenze	2,3741
			Obergrenze	2,8052
		5% getrimmtes Mittel		2,5617
		Median		2,5714
		Varianz		,611
		Standard Abweichung		,78195
		Minimum		1,07
		Maximum		5,00
		Spannweite		3,93
		Interquartilbereich		1,07
		Schiefe		,577
		Kurtosis		,864
	Hauptschulabschluss	Mittelwert		2,6126
		95% Konfidenzintervall des Mittelwerts	Untergrenze	2,4144
			Obergrenze	2,8107
		5% getrimmtes Mittel		2,5762
		Median		2,5714
		Varianz		,660
		Standard Abweichung		,81243
		Minimum		1,07
		Maximum		5,00
		Spannweite		3,93
		Interquartilbereich		1,07

Deskriptive Statistik

	Edu2			Standard Fehler
		Kurtosis		,520
	Abitur und höher (Studium, Ausbildung, Promotion)	Mittelwert		,13712
		95% Konfidenzintervall des Mittelwerts	Untergrenze	
			Obergrenze	
		5% getrimmtes Mittel		
		Median		
		Varianz		
		Standard Abweichung		
		Minimum		
		Maximum		
		Spannweite		
		Interquartilbereich		
		Schiefe		,393
		Kurtosis		,768
ALL_post	kein Abschluss	Mittelwert		,10741
		95% Konfidenzintervall des Mittelwerts	Untergrenze	
			Obergrenze	
		5% getrimmtes Mittel		
		Median		
		Varianz		
		Standard Abweichung		
		Minimum		
		Maximum		
		Spannweite		
		Interquartilbereich		
		Schiefe		,327
		Kurtosis		,644
	Hauptschulabschluss	Mittelwert		,09925
		95% Konfidenzintervall des Mittelwerts	Untergrenze	
			Obergrenze	
		5% getrimmtes Mittel		
		Median		
		Varianz		
		Standard Abweichung		
		Minimum		
		Maximum		
		Spannweite		
		Interquartilbereich		

Deskriptive Statistik

Edu2				Statistik
		Schiefe		,575
		Kurtosis		,670
	Mittlere Reife	Mittelwert		2,9220
		95% Konfidenzintervall des Mittelwerts	Untergrenze	2,7502
			Obergrenze	3,0937
		5% getrimmtes Mittel		2,9193
		Median		3,0000
		Varianz		,626
		Standard Abweichung		,79132
		Minimum		1,00
		Maximum		5,00
		Spannweite		4,00
		Interquartilbereich		1,01
		Schiefe		,102
		Kurtosis		,146
	Abitur und höher (Studium, Ausbildung, Promotion)	Mittelwert		3,2422
		95% Konfidenzintervall des Mittelwerts	Untergrenze	3,0072
			Obergrenze	3,4772
		5% getrimmtes Mittel		3,2294
		Median		3,2500
		Varianz		,482
		Standard Abweichung		,69453
		Minimum		2,00
		Maximum		4,71
		Spannweite		2,71
		Interquartilbereich		,70
		Schiefe		,200
		Kurtosis		-,057

Deskriptive Statistik

Edu2				Standard Fehler
		Schiefe		,293
		Kurtosis		,578
	Mittlere Reife	Mittelwert		,08634
		95% Konfidenzintervall des Mittelwerts	Untergrenze	
			Obergrenze	
		5% getrimmtes Mittel		
		Median		
		Varianz		
		Standard Abweichung		
		Minimum		
		Maximum		
		Spannweite		
		Interquartilbereich		
		Schiefe		,263
		Kurtosis		,520
	Abitur und höher (Studium, Ausbildung, Promotion)	Mittelwert		,11576
		95% Konfidenzintervall des Mittelwerts	Untergrenze	
			Obergrenze	
		5% getrimmtes Mittel		
		Median		
		Varianz		
		Standard Abweichung		
		Minimum		
		Maximum		
		Spannweite		
		Interquartilbereich		
		Schiefe		,393
		Kurtosis		,768

Tests auf Normalverteilung

	Edu2	Kolmogorov-Smirnov[a] Statistik	df	Signifikanz	Shapiro-Wilk Statistik	df
ALL_pre	kein Abschluss	,123	53	,045	,942	53
	Hauptschulabschluss	,095	67	,200*	,944	67
	Mittlere Reife	,120	84	,004	,970	84
	Abitur und höher (Studium, Ausbildung, Promotion)	,088	36	,200*	,987	36
ALL_post	kein Abschluss	,074	53	,200*	,975	53
	Hauptschulabschluss	,089	67	,200*	,965	67
	Mittlere Reife	,072	84	,200*	,990	84
	Abitur und höher (Studium, Ausbildung, Promotion)	,113	36	,200*	,965	36

Tests auf Normalverteilung

	Edu2	Shapiro-Wilk Signifikanz
ALL_pre	kein Abschluss	,012
	Hauptschulabschluss	,005
	Mittlere Reife	,049
	Abitur und höher (Studium, Ausbildung, Promotion)	,939
ALL_post	kein Abschluss	,316
	Hauptschulabschluss	,057
	Mittlere Reife	,794
	Abitur und höher (Studium, Ausbildung, Promotion)	,299

*. Dies ist eine untere Grenze der echten Signifikanz.

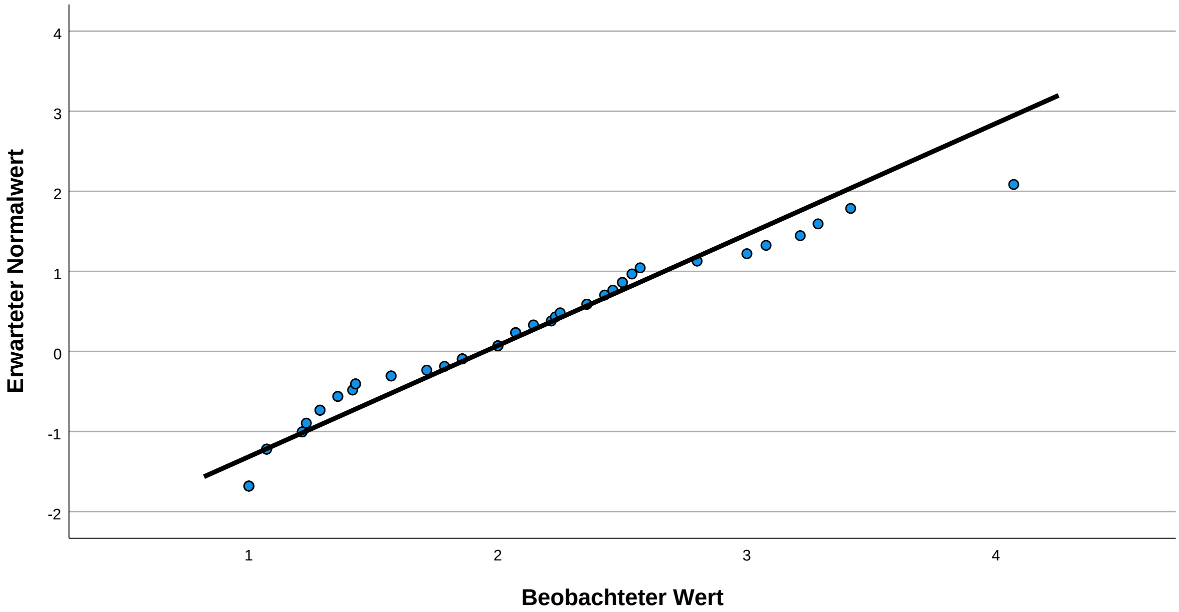
a. Signifikanzkorrektur nach Lilliefors

ALL_pre

Normalverteilote Q-Q-Diagramme

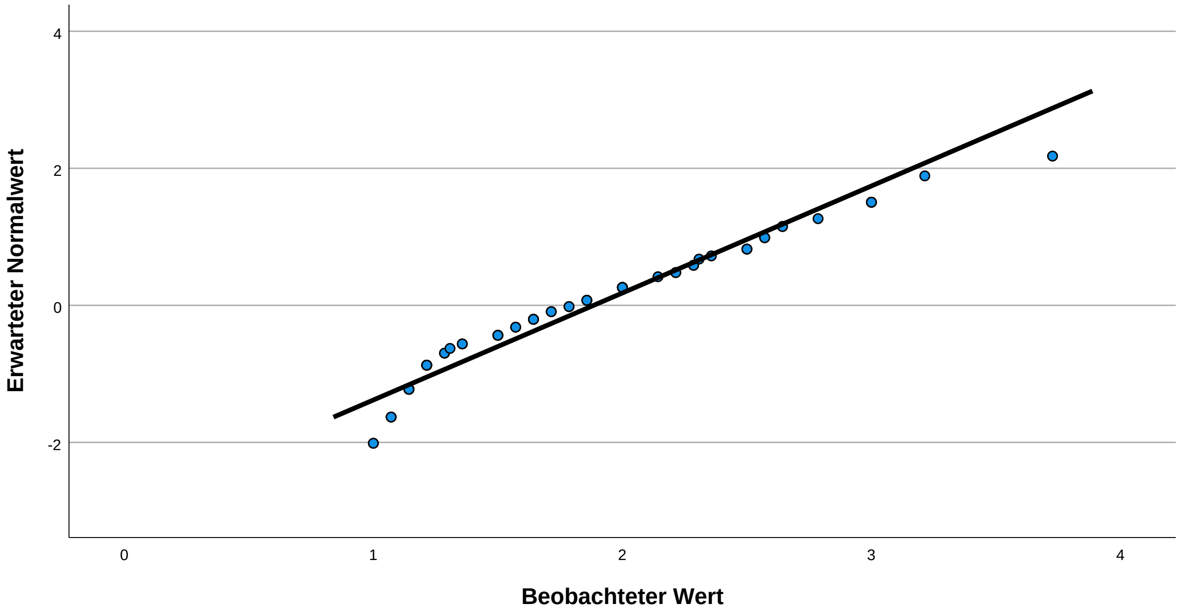
Q-Q-Diagramm von ALL_pre

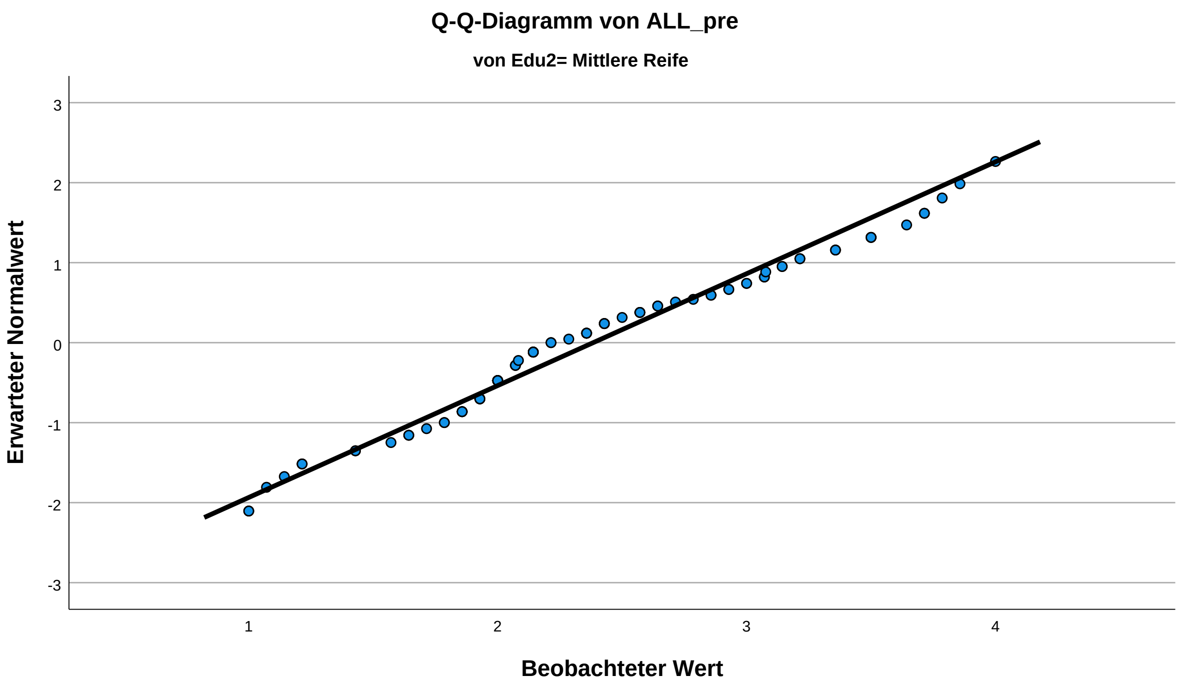
von Edu2= kein Abschluss

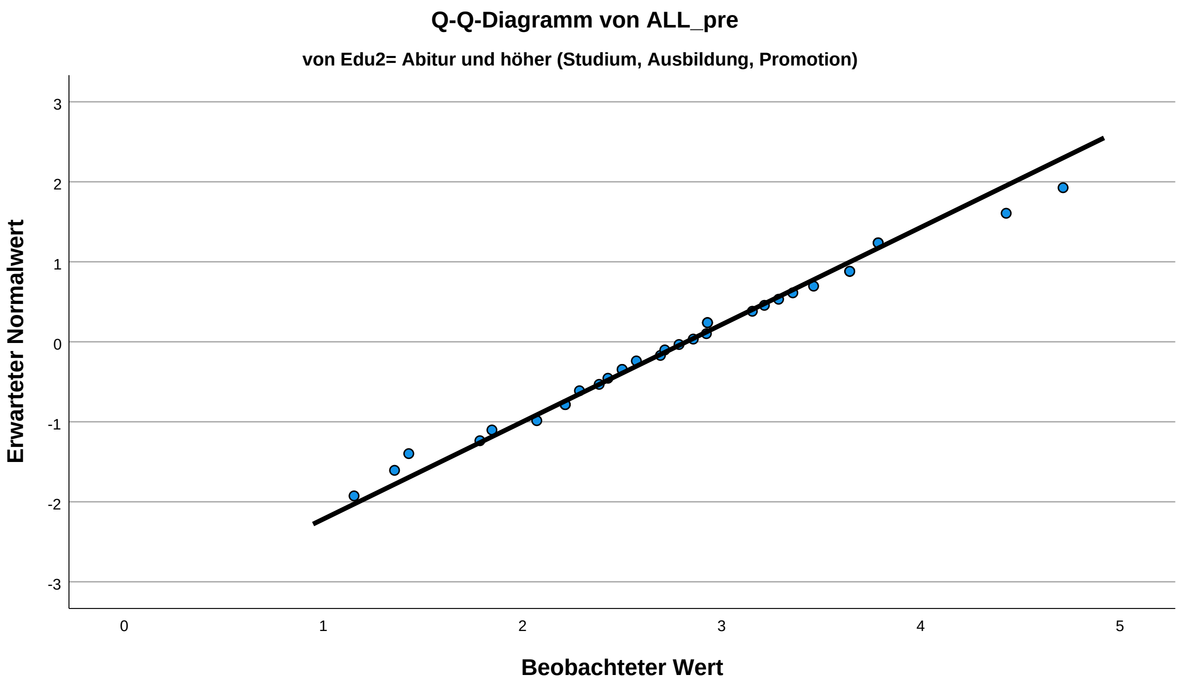


Q-Q-Diagramm von ALL_pre

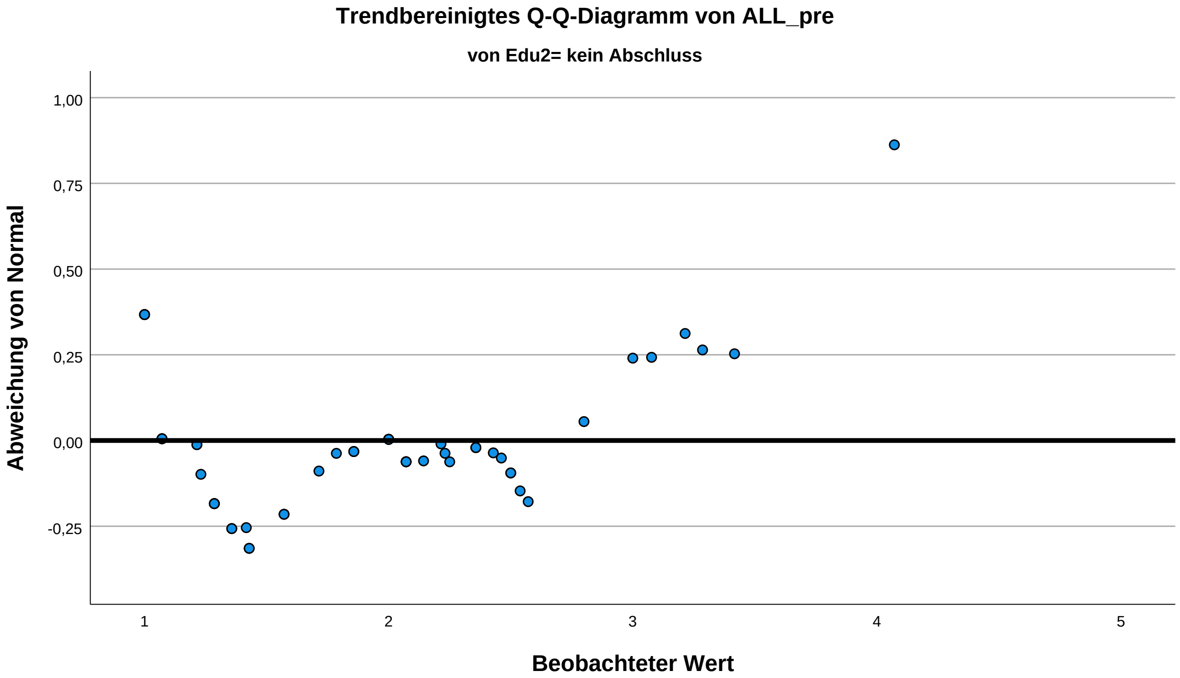
von Edu2= Hauptschulabschluss

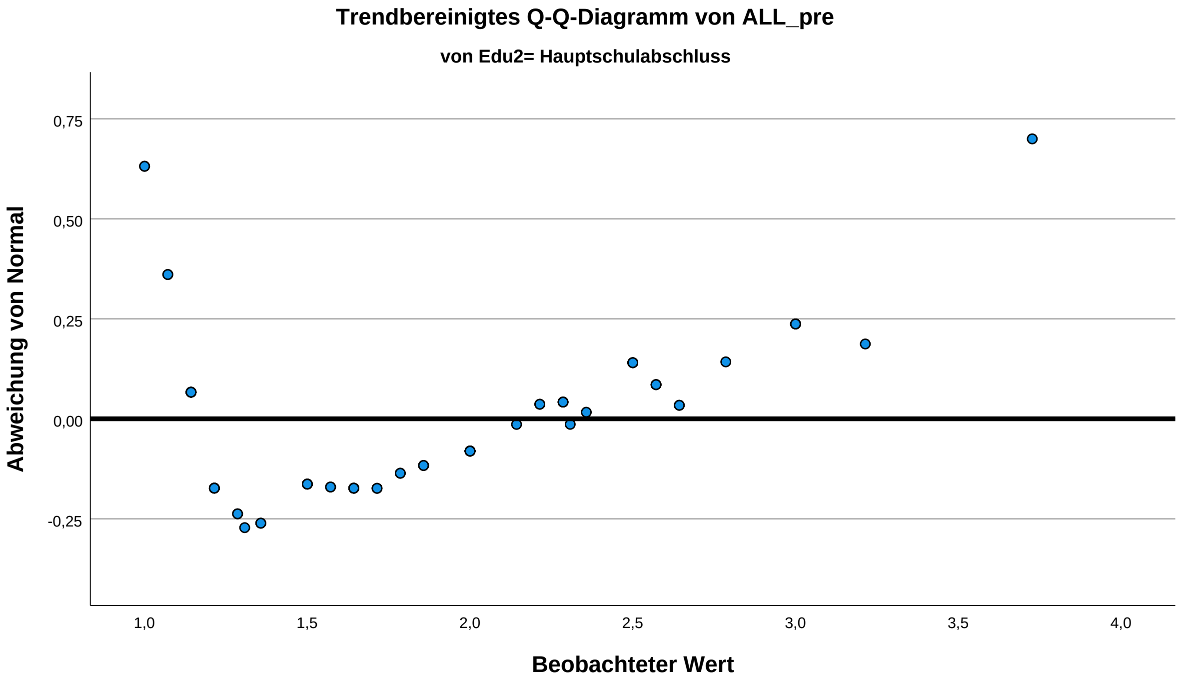


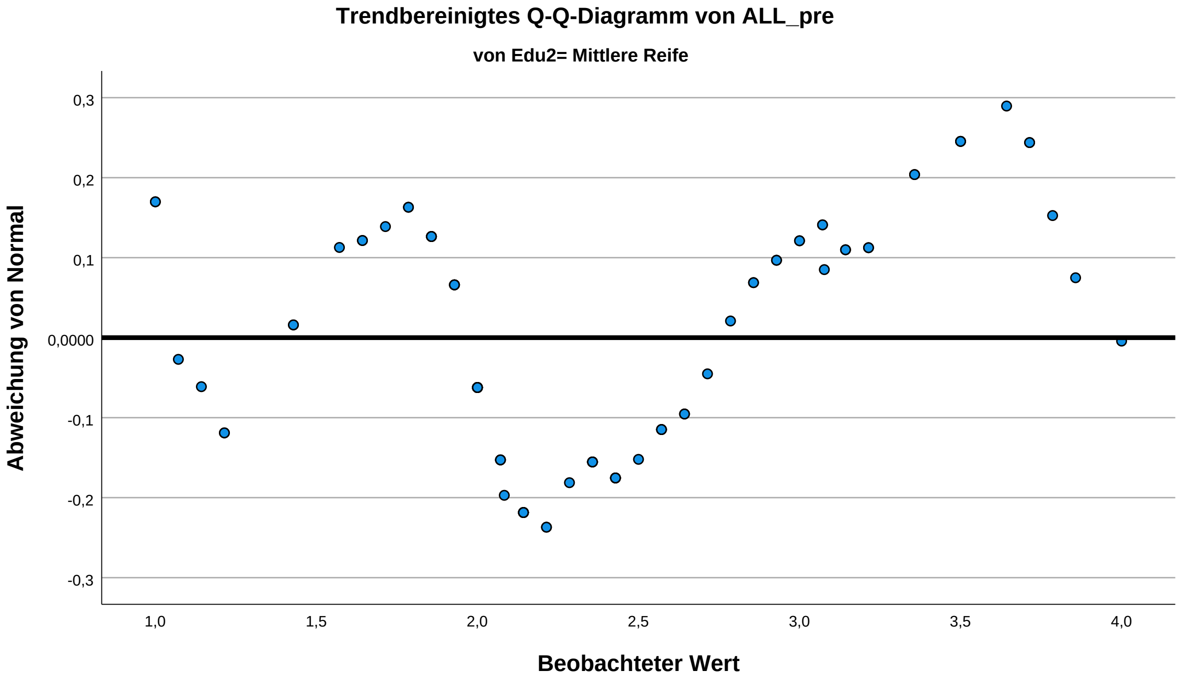


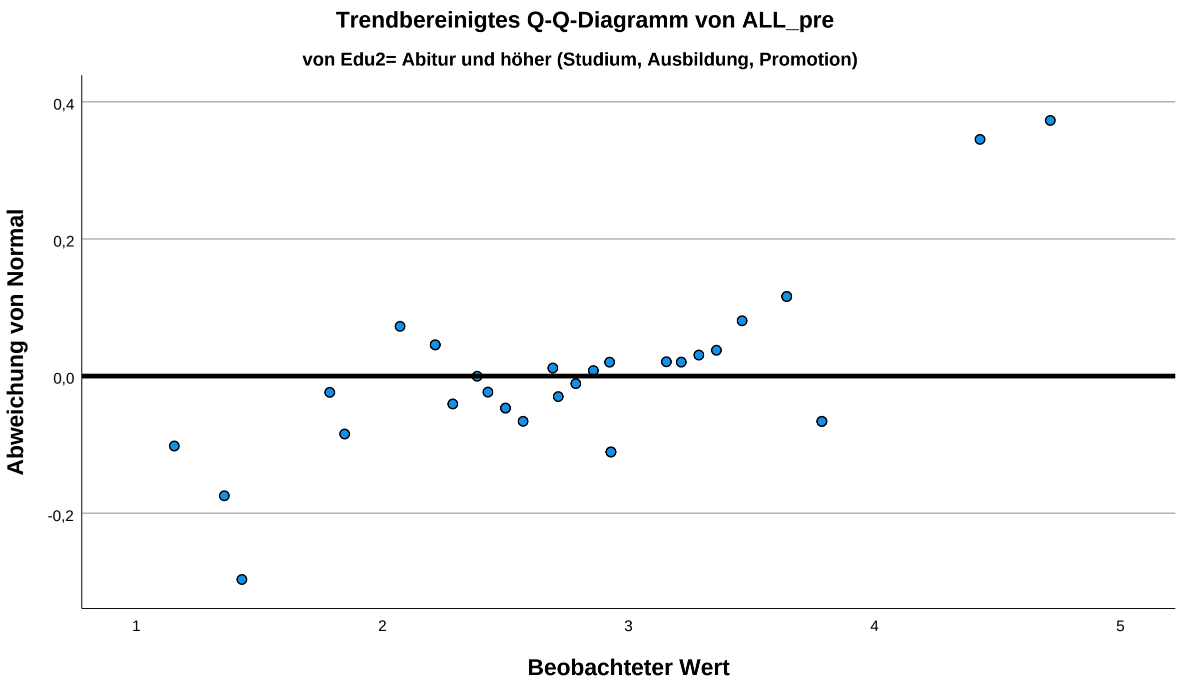


Trendbereinigte normalverteilte Q-Q-Diagramme


Trendbereinigtes Q-Q-Diagramm von ALL_pre
von Edu2= kein Abschluss
Abweichung von Normal
1,00
0,75
0,50
0,25
0,00
-0,25
1
2
3
4
5
Beobachteter Wert

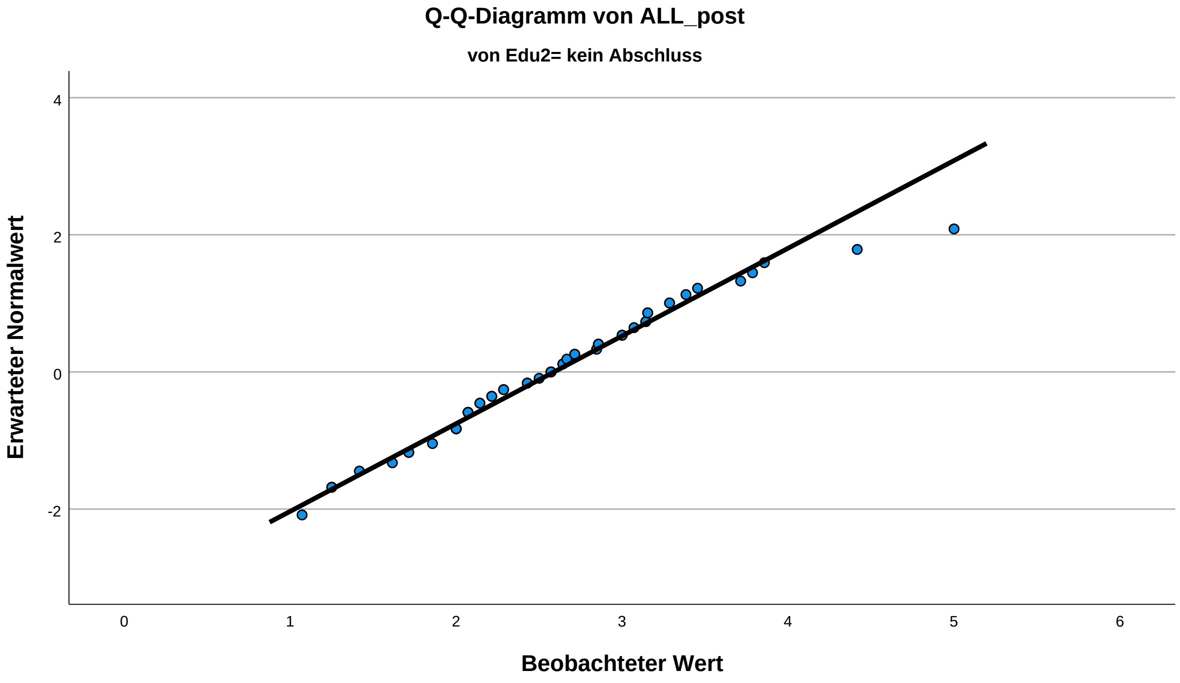

Trendbereinigtes Q-Q-Diagramm von ALL_pre
von Edu2= Hauptschulabschluss
Abweichung von Normal
0,75
0,50
0,25
0,00
-0,25
1,0
1,5
2,0
2,5
3,0
3,5
4,0
Beobachteter Wert

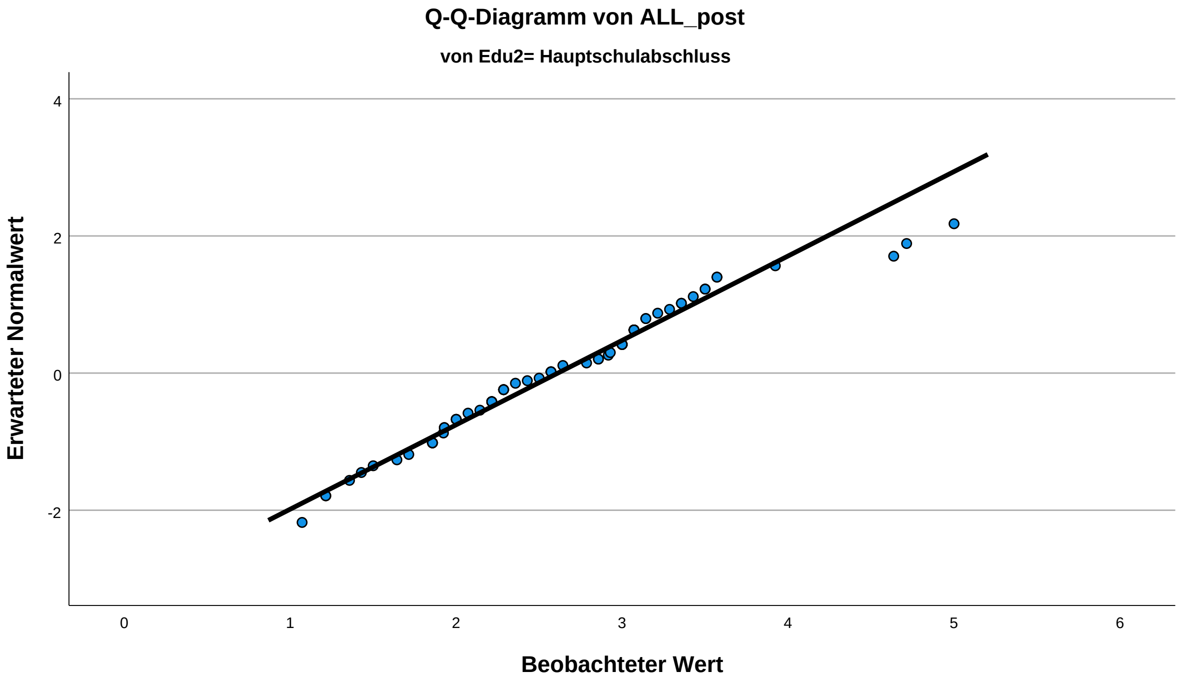




ALL_post

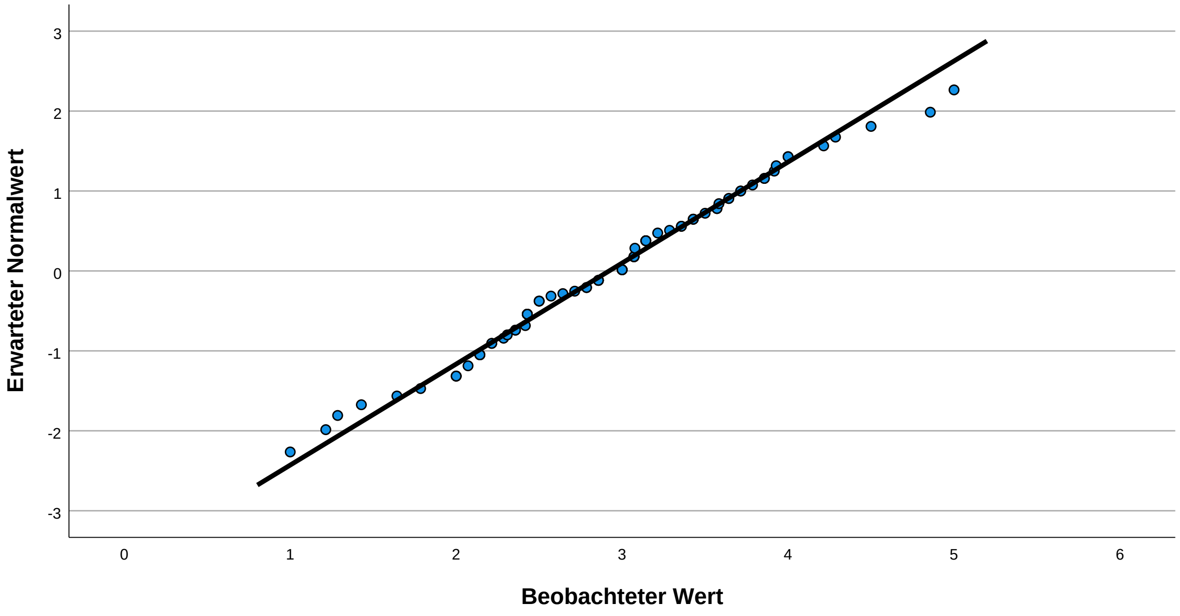
Normalverteilote Q-Q-Diagramme


Q-Q-Diagramm von ALL_post
von Edu2= kein Abschluss
Erwarteter Normalwert
4
2
0
-2
0
1
2
3
4
5
6
Beobachteter Wert


Q-Q-Diagramm von ALL_post
von Edu2= Hauptschulabschluss
Erwarteter Normalwert
4
2
0
-2
0
1
2
3
4
5
6
Beobachteter Wert

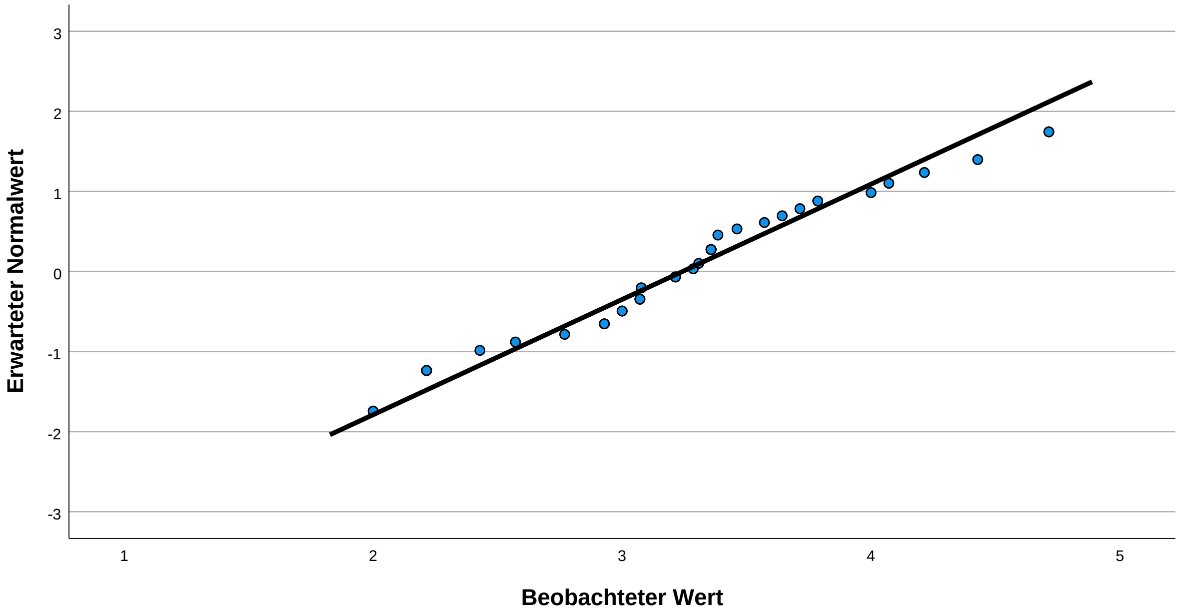
Q-Q-Diagramm von ALL_post

von Edu2= Mittlere Reife

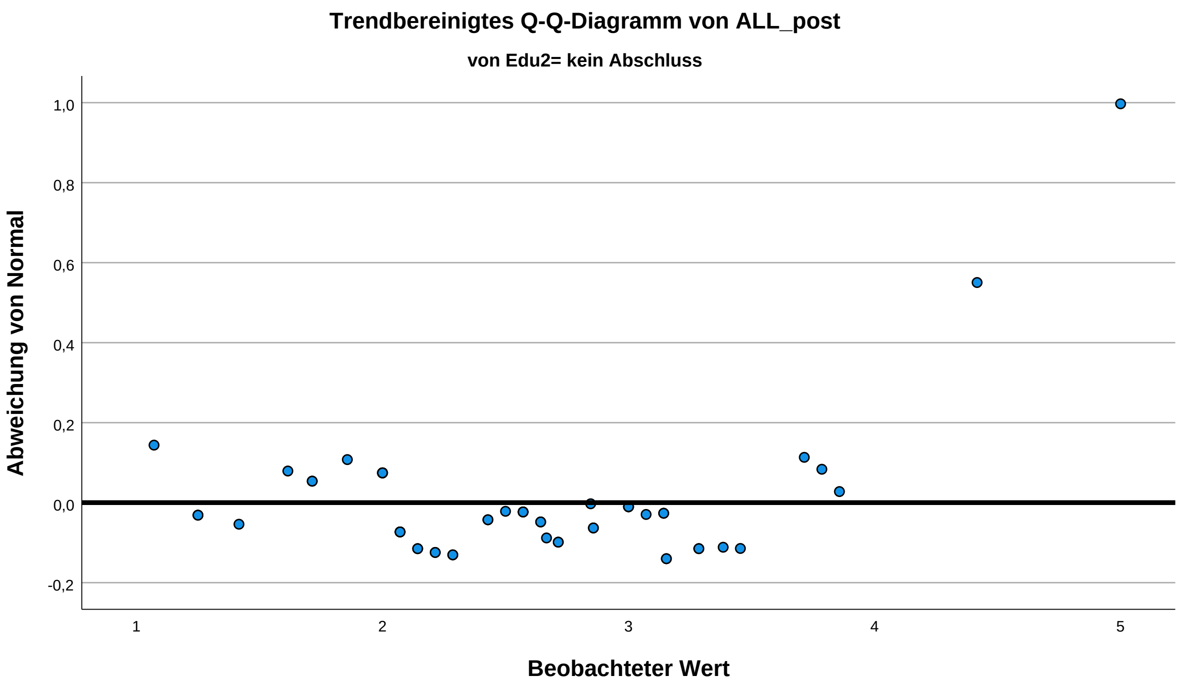


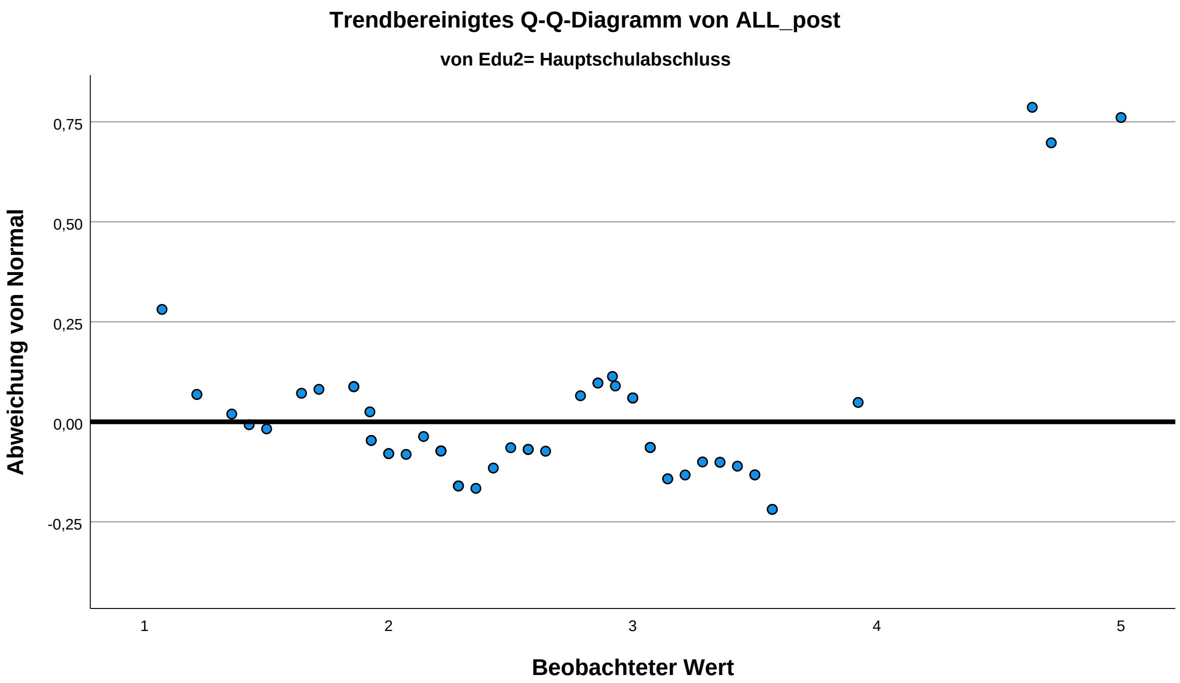
Q-Q-Diagramm von ALL_post

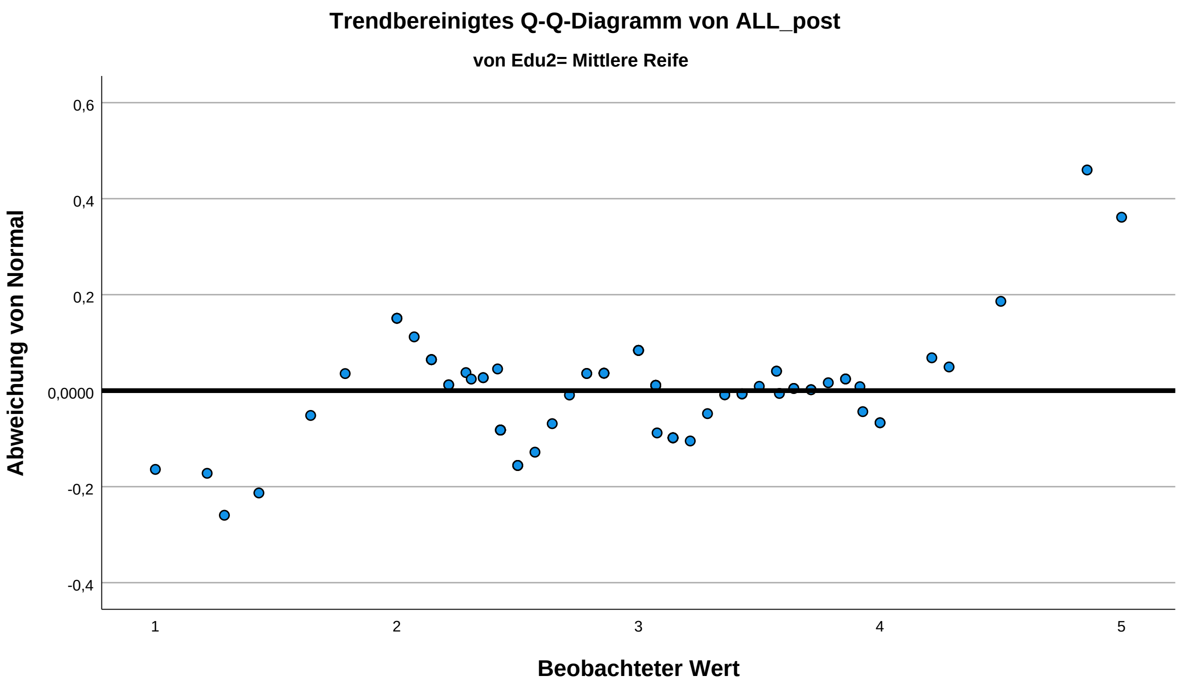
von Edu2= Abitur und höher (Studium, Ausbildung, Promotion)

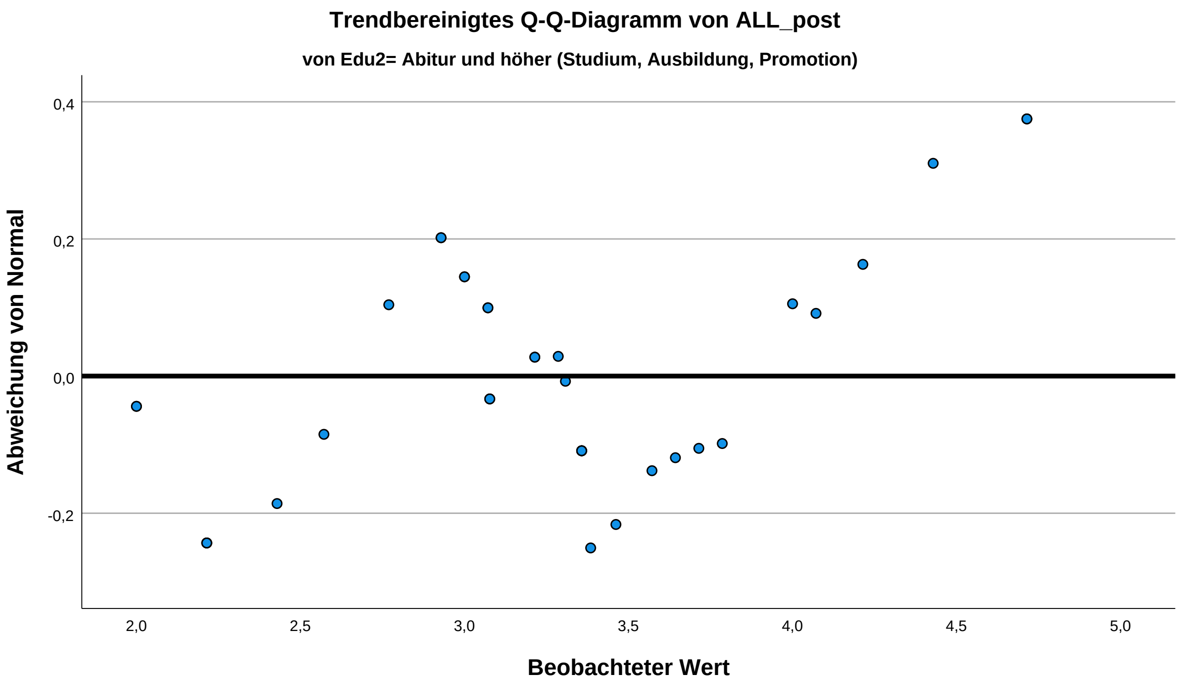


Trendbereinigte normalverteilte Q-Q-Diagramme


Trendbereinigtes Q-Q-Diagramm von ALL_post
von Edu2= kein Abschluss
Abweichung von Normal
1,0
0,8
0,6
0,4
0,2
0,0
-0,2
1
2
3
4
5
Beobachteter Wert


Trendbereinigtes Q-Q-Diagramm von ALL_post
von Edu2= Hauptschulabschluss
Abweichung von Normal
0,75
0,50
0,25
0,00
-0,25
1
2
3
4
5
Beobachteter Wert






```
EXAMINE VARIABLES=ALL_pre ALL_post
 /COMPARE VARIABLE
 /PLOT=BOXPLOT
 /STATISTICS=NONE
 /NOTOTAL
 /MISSING=LISTWISE.
```
**Auf Ausreißer überprüfen **

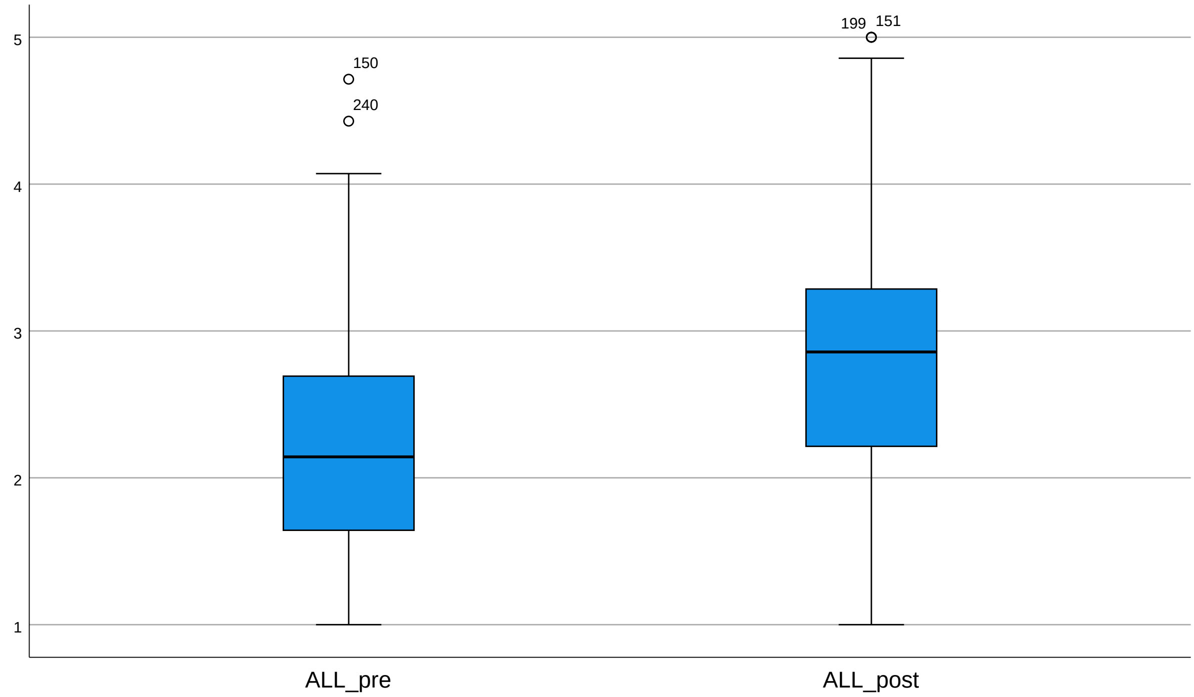
Explorative Datenanalyse

Hinweise

Ausgabe erstellt		25-MAR-2025 12:28:24
Kommentare		
Eingabe	Daten	/Users/janschlueter/sciebo - Schlüter, Jan Steffen (j23s00908@hs-bochum.de)@hs-bochum.sciebo.de/Paper Digitalkompetenzen mit HRW Hellwig/Fragebogenauswertung_DIE-Impact-bereinigt.sav
	Aktiver Datensatz	DataSet1
	Filter	<keine>
	Gewichtung	<keine>
	Aufgeteilte Datei	<keine>
	Anzahl der Zeilen in der Arbeitsdatei	242
Behandlung fehlender Werte	Definition von Fehlend	Benutzerdefinierte fehlende Werte für abhängige Variablen werden als fehlend behandelt.
	Verwendete Fälle	Statistiken basieren auf Fällen, die bei keinen Variablen oder Faktoren fehlende Werte aufweisen.
Syntax		EXAMINE VARIABLES=ALL_pre ALL_post /COMPARE VARIABLE /PLOT=BOXPLOT /STATISTICS=NONE /NOTOTAL /MISSING=LISTWISE.
Ressourcen	Prozessorzeit	00:00:00,17
	Verstrichene Zeit	00:00:00,00

Verarbeitete Fälle

	Fälle					
	Gültig		Fehlend		Gesamt	
	N	Prozent	N	Prozent	N	Prozent
ALL_pre	242	100,0%	0	0,0%	242	100,0%
ALL_post	242	100,0%	0	0,0%	242	100,0%




```
USE ALL.
COMPUTE filter_$=(ALL_pre < 4.1).
VARIABLE LABELS filter_$ 'ALL_pre < 4.1 (FILTER)'.
VALUE LABELS filter_$ 0 'Not Selected' 1 'Selected'.
FORMATS filter_$ (f1.0).
FILTER BY filter_$.
EXECUTE.
USE ALL.
COMPUTE filter_$=(ALL_pre < 4.1 & ALL_post = 5).
VARIABLE LABELS filter_$ 'ALL_pre < 4.1 & ALL_post = 5 (FILTER)'.
VALUE LABELS filter_$ 0 'Not Selected' 1 'Selected'.
FORMATS filter_$ (f1.0).
FILTER BY filter_$.
EXECUTE.
USE ALL.
COMPUTE filter_$=(ALL_pre < 4.1 & ALL_post < 4.95).
VARIABLE LABELS filter_$ 'ALL_pre < 4.1 & ALL_post < 4.95 (FILTER)'.
VALUE LABELS filter_$ 0 'Not Selected' 1 'Selected'.
FORMATS filter_$ (f1.0).
FILTER BY filter_$.
EXECUTE.
GLM ALL_pre ALL_post BY Experience
  /WSFACTOR=Zeit 2 Polynomial
  /METHOD=SSTYPE(3)
  /POSTHOC=Experience(TUKEY GH)
  /PLOT=PROFILE(Zeit*Experience) TYPE=LINE ERRORBAR=NO MEANREFERENCE=NO YAXI
```

```
S=AUTO
 /PRINT=DESCRIPTIVE ETASQ HOMOGENEITY
 /CRITERIA=ALPHA(.05)
 /WSDESIGN=Zeit
 /DESIGN=Experience.
**MIXED ANOVA für Experience**
```

Allgemeines lineares Modell

Hinweise

Ausgabe erstellt		25-MAR-2025 12:33:42
Kommentare		
Eingabe	Daten	/Users/janschlueter/sciebo - Schlüter, Jan Steffen (j23s00908@hs-bochum.de)@hs-bochum.sciebo.de/Paper Digitalkompetenzen mit HRW Hellwig/Fragebogenauswertung_DIE-Impact-bereinigt.sav
	Aktiver Datensatz	DataSet1
	Filter	ALL_pre < 4.1 & ALL_post < 4.95 (FILTER)
	Gewichtung	<keine>
	Aufgeteilte Datei	<keine>
	Anzahl der Zeilen in der Arbeitsdatei	237
Behandlung fehlender Werte	Definition für "fehlend"	Benutzerdefinierte fehlende Werte gelten als fehlend.
	Verwendete Fälle	Die Statistik basiert auf allen Fällen mit gültigen Daten für alle Variablen im Modell.

Hinweise

Syntax		GLM ALL_pre ALL_post BY Experience /WSFACTOR=Zeit 2 Polynomial /METHOD=SSTYPE(3) /POSTHOC=Experience (TUKEY GH) /PLOT=PROFILE (Zeit*Experience) TYPE=LINE ERRORBAR=NO MEANREFERENCE=NO YAXIS=AUTO /PRINT=DESCRIPTIVE ETASQ HOMOGENEITY /CRITERIA=ALPHA(.05) /WSDESIGN=Zeit /DESIGN=Experience.
Ressourcen	Prozessorzeit	00:00:00,19
	Verstrichene Zeit	00:00:00,00

Warnungen

Die Post-Hoc-Tests werden für Experience nicht ausgeführt, weil weniger als drei Gruppen vorhanden sind.

Innersubjektfaktoren

Maß: MASS_1

Zeit	Abhängige Variable
1	ALL_pre
2	ALL_post

Zwischensubjektfaktoren

		Wertbeschriftung	N
Experience	0	keine Erfahrung	212
	1	Vorerfahrung	23

Deskriptive Statistiken

	Experience	Mittelwert	Standardabweichung	N
ALL_pre	keine Erfahrung	2,1092	,71872	212
	Vorerfahrung	2,8075	,82781	23
	Gesamt	2,1776	,75726	235
ALL_post	keine Erfahrung	2,7223	,74660	212
	Vorerfahrung	3,2205	,75437	23
	Gesamt	2,7710	,76035	235

Box-Test auf Gleichheit der Kovarianz-Matrizen[a]

Box' M	1,647
F	,531
df1	3
df2	17788,232
Sig.	,661

Prüft die Nullhypothese, dass die beobachteten Kovarianzen-matrizen der abhängigen Variablen über die Gruppen gleich sind.

a. Design: Konstanter Term + Experience

Innersubjektdesign: Zeit

Multivariate Tests[a]

Effekt		Wert	F	Hypothese df	Fehler df
Zeit	Pillai-Spur	,272	87,206[b]	1,000	233,000
	Wilks-Lambda	,728	87,206[b]	1,000	233,000
	Hotelling-Spur	,374	87,206[b]	1,000	233,000
	Größte charakteristische Wurzel nach Roy	,374	87,206[b]	1,000	233,000
Zeit * Experience	Pillai-Spur	,014	3,313[b]	1,000	233,000
	Wilks-Lambda	,986	3,313[b]	1,000	233,000
	Hotelling-Spur	,014	3,313[b]	1,000	233,000
	Größte charakteristische Wurzel nach Roy	,014	3,313[b]	1,000	233,000

Multivariate Tests[a]

Effekt		Sig.	Partielles Eta-Quadrat
Zeit	Pillai-Spur	,000	,272
	Wilks-Lambda	,000	,272
	Hotelling-Spur	,000	,272
	Größte charakteristische Wurzel nach Roy	,000	,272
Zeit * Experience	Pillai-Spur	,070	,014
	Wilks-Lambda	,070	,014
	Hotelling-Spur	,070	,014
	Größte charakteristische Wurzel nach Roy	,070	,014

a. Design: Konstanter Term + Experience
Innersubjektdesign: Zeit

b. Exakte Statistik

Mauchly-Test auf Sphärizität[a]

Maß: MASS_1

Innersubjekteffekt	Mauchly-W	Ungefähres Chi-Quadrat	df	Sig.	Epsilon[b] Greenhouse-Geisser
Zeit	1,000	,000	0	.	1,000

Mauchly-Test auf Sphärizität[a]

Maß: MASS_1

Innersubjekteffekt	Epsilon[b] Huynh-Feldt (HF)	Untergrenze
Zeit	1,000	1,000

Prüft die Nullhypothese, dass sich die Fehlerkovarianz-Matrix der orthonormalisierten transformierten abhängigen Variablen proportional zur Einheitsmatrix verhält.

a. Design: Konstanter Term + Experience
Innersubjektdesign: Zeit

b. Kann zum Korrigieren der Freiheitsgrade für die gemittelten Signifikanztests verwendet werden. In der Tabelle mit den Tests der Effekte innerhalb der Subjekte werden korrigierte Tests angezeigt.

Tests der Innersubjekteffekte

Maß: MASS_1

Quelle		Typ III Quadratsumme	df	Mittel der Quadrate	F
Zeit	Sphärizität angenommen	10,923	1	10,923	87,206
	Greenhouse-Geisser	10,923	1,000	10,923	87,206
	Huynh-Feldt (HF)	10,923	1,000	10,923	87,206
	Untergrenze	10,923	1,000	10,923	87,206
Zeit * Experience	Sphärizität angenommen	,415	1	,415	3,313
	Greenhouse-Geisser	,415	1,000	,415	3,313
	Huynh-Feldt (HF)	,415	1,000	,415	3,313
	Untergrenze	,415	1,000	,415	3,313
Fehler(Zeit)	Sphärizität angenommen	29,184	233	,125	
	Greenhouse-Geisser	29,184	233,000	,125	
	Huynh-Feldt (HF)	29,184	233,000	,125	
	Untergrenze	29,184	233,000	,125	

Tests der Innersubjekteffekte

Maß: MASS_1

Quelle		Sig.	Partielles Eta-Quadrat
Zeit	Sphärizität angenommen	,000	,272
	Greenhouse-Geisser	,000	,272
	Huynh-Feldt (HF)	,000	,272
	Untergrenze	,000	,272
Zeit * Experience	Sphärizität angenommen	,070	,014
	Greenhouse-Geisser	,070	,014
	Huynh-Feldt (HF)	,070	,014
	Untergrenze	,070	,014
Fehler(Zeit)	Sphärizität angenommen		
	Greenhouse-Geisser		
	Huynh-Feldt (HF)		
	Untergrenze		

Tests der Innersubjektkontraste

Maß: MASS_1

Quelle	Zeit	Typ III Quadratsumme	df	Mittel der Quadrate	F	Sig.
Zeit	Linear	10,923	1	10,923	87,206	,000
Zeit * Experience	Linear	,415	1	,415	3,313	,070
Fehler(Zeit)	Linear	29,184	233	,125		

Tests der Innersubjektkontraste

Maß: MASS_1

Quelle	Zeit	Partielles Eta-Quadrat
Zeit	Linear	,272
Zeit * Experience	Linear	,014
Fehler(Zeit)	Linear	

Levene-Test auf Gleichheit der Fehlervarianzen[a]

		Levene-Statistik	df1	df2	Sig.
ALL_pre	Basiert auf dem Mittelwert	1,118	1	233	,292
	Basiert auf dem Median	1,065	1	233	,303
	Basierend auf dem Median und mit angepaßten df	1,065	1	232,703	,303
	Basiert auf dem getrimmten Mittel	1,241	1	233	,266
ALL_post	Basiert auf dem Mittelwert	,018	1	233	,894
	Basiert auf dem Median	,000	1	233	,997
	Basierend auf dem Median und mit angepaßten df	,000	1	232,871	,997
	Basiert auf dem getrimmten Mittel	,017	1	233	,897

Prüft die Nullhypothese, dass die Fehlervarianz der abhängigen Variablen über Gruppen hinweg gleich ist.

a. Design: Konstanter Term + Experience
Innersubjektdesign: Zeit

Tests der Zwischensubjekteffekte

Maß: MASS_1

Transformierte Variable: Mittel

Quelle	Typ III Quadratsumme	df	Mittel der Quadrate	F	Sig.
Konstanter Term	1223,436	1	1223,436	1266,823	,000
Experience	14,851	1	14,851	15,378	,000
Fehler	225,020	233	,966		

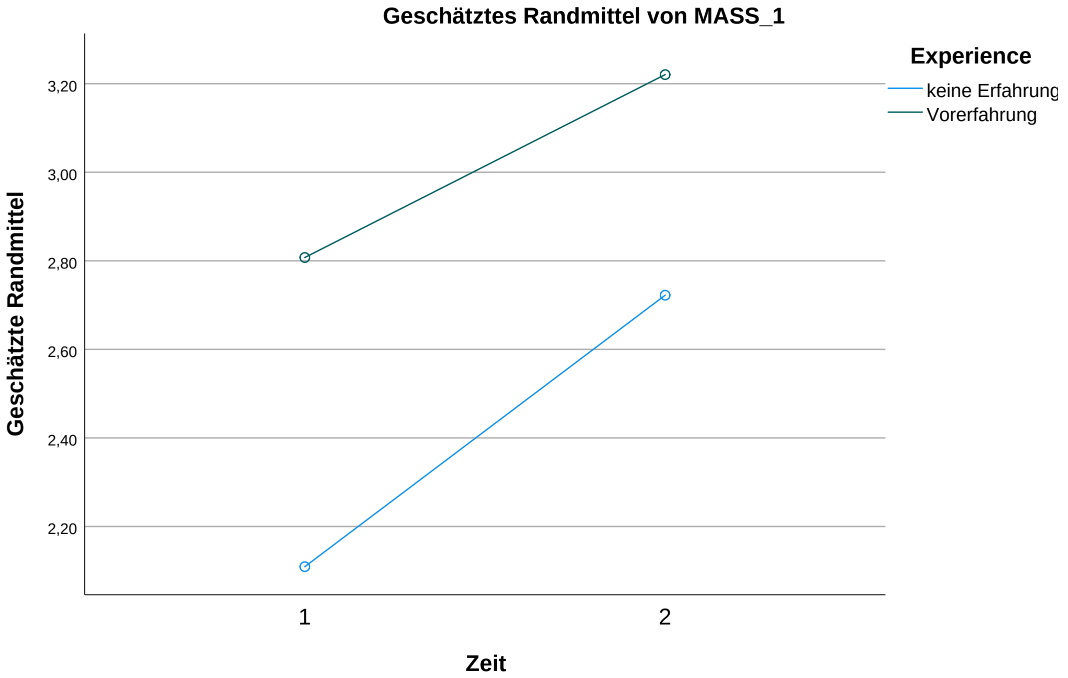
Tests der Zwischensubjekteffekte

Maß: MASS_1

Transformierte Variable: Mittel

Quelle	Partielles Eta-Quadrat
Konstanter Term	,845
Experience	,062
Fehler	

Profilplots




```
GLM ALL_pre ALL_post BY AGE2
 /WSFACTOR=Zeit 2 Polynomial
 /METHOD=SSTYPE(3)
 /POSTHOC=AGE2(TUKEY GH)
 /PLOT=PROFILE(Zeit*AGE2) TYPE=LINE ERRORBAR=NO MEANREFERENCE=NO YAXIS=AU
TO
 /PRINT=DESCRIPTIVE ETASQ HOMOGENEITY
 /CRITERIA=ALPHA(.05)
 /WSDESIGN=Zeit
 /DESIGN=AGE2.
```

MIXED ANOVA für AGE

Allgemeines lineares Modell

Hinweise

Ausgabe erstellt		25-MAR-2025 12:41:08
Kommentare		
Eingabe	Daten	/Users/janschlueter/sciebo - Schlüter, Jan Steffen (j23s00908@hs-bochum.de)@hs-bochum.sciebo.de/Paper Digitalkompetenzen mit HRW Hellwig/Fragebogenauswertung_DIE-Impact-bereinigt.sav
	Aktiver Datensatz	DataSet1
	Filter	ALL_pre < 4.1 & ALL_post < 4.95 (FILTER)
	Gewichtung	<keine>
	Aufgeteilte Datei	<keine>
	Anzahl der Zeilen in der Arbeitsdatei	237
Behandlung fehlender Werte	Definition für "fehlend"	Benutzerdefinierte fehlende Werte gelten als fehlend.
	Verwendete Fälle	Die Statistik basiert auf allen Fällen mit gültigen Daten für alle Variablen im Modell.
Syntax		GLM ALL_pre ALL_post BY AGE2 /WSFACTOR=Zeit 2 Polynomial /METHOD=SSTYPE(3) /POSTHOC=AGE2 (TUKEY GH) /PLOT=PROFILE (Zeit*AGE2) TYPE=LINE ERRORBAR=NO MEANREFERENCE=NO YAXIS=AUTO /PRINT=DESCRIPTIVE ETASQ HOMOGENEITY /CRITERIA=ALPHA(.05) /WSDESIGN=Zeit /DESIGN=AGE2.
Ressourcen	Prozessorzeit	00:00:00,24
	Verstrichene Zeit	00:00:00,00

Warnungen

Die Post-Hoc-Tests werden für AGE2 nicht ausgeführt, weil weniger als drei Gruppen vorhanden sind.

Innersubjektfaktoren

Maß: MASS_1

Zeit	Abhängige Variable
1	ALL_pre
2	ALL_post

Zwischensubjektfaktoren

		Wertbeschriftung	N
AGE2	1	<20	193
	2	>20	44

Deskriptive Statistiken

	AGE2	Mittelwert	Standardabweichung	N
ALL_pre	<20	2,0943	,73069	193
	>20	2,5482	,75218	44
	Gesamt	2,1785	,75414	237
ALL_post	<20	2,7121	,75998	193
	>20	2,9954	,73070	44
	Gesamt	2,7647	,76115	237

Box-Test auf Gleichheit der Kovarianz-Matrizen[a]

Box' M	12,029
F	3,939
df1	3
df2	82139,181
Sig.	,088

Prüft die Nullhypothese, dass die beobachteten Kovarianzen-matrizen der abhängigen Variablen über die Gruppen gleich sind.

a. Design: Konstanter Term + AGE2

Innersubjekt...

Multivariate Tests[a]

Effekt		Wert	F	Hypothese df	Fehler df
Zeit	Pillai-Spur	,404	159,517[b]	1,000	235,000
	Wilks-Lambda	,596	159,517[b]	1,000	235,000
	Hotelling-Spur	,679	159,517[b]	1,000	235,000
	Größte charakteristische Wurzel nach Roy	,679	159,517[b]	1,000	235,000
Zeit * AGE2	Pillai-Spur	,017	4,097[b]	1,000	235,000
	Wilks-Lambda	,983	4,097[b]	1,000	235,000
	Hotelling-Spur	,017	4,097[b]	1,000	235,000
	Größte charakteristische Wurzel nach Roy	,017	4,097[b]	1,000	235,000

Multivariate Tests[a]

Effekt		Sig.	Partielles Eta-Quadrat
Zeit	Pillai-Spur	,000	,404
	Wilks-Lambda	,000	,404
	Hotelling-Spur	,000	,404
	Größte charakteristische Wurzel nach Roy	,000	,404
Zeit * AGE2	Pillai-Spur	,044	,017
	Wilks-Lambda	,044	,017
	Hotelling-Spur	,044	,017
	Größte charakteristische Wurzel nach Roy	,044	,017

a. Design: Konstanter Term + AGE2
Innersubjektdesign: Zeit

b. Exakte Statistik

Mauchly-Test auf Sphärizität[a]

Maß: MASS_1

Innersubjekteffekt	Mauchly-W	Ungefähres Chi-Quadrat	df	Sig.	Epsilon[b] Greenhouse-Geisser
Zeit	1,000	,000	0	.	1,000

Mauchly-Test auf Sphärizität[a]

Maß: MASS_1

Innersubjekteffekt	Epsilon[b] Huynh-Feldt (HF)	Untergrenze
Zeit	1,000	1,000

Prüft die Nullhypothese, dass sich die Fehlerkovarianz-Matrix der orthonormalisierten transformierten abhängigen Variablen proportional zur Einheitsmatrix verhält.

a. Design: Konstanter Term + AGE2
Innersubjektdesign: Zeit

b. Kann zum Korrigieren der Freiheitsgrade für die gemittelten Signifikanztests verwendet werden. In der Tabelle mit den Tests der Effekte innerhalb der Subjekte werden korrigierte Tests angezeigt.

Tests der Innersubjekteffekte

Maß: MASS_1

Quelle		Typ III Quadratsumme	df	Mittel der Quadrate	F
Zeit	Sphärizität angenommen	20,322	1	20,322	159,517
	Greenhouse-Geisser	20,322	1,000	20,322	159,517
	Huynh-Feldt (HF)	20,322	1,000	20,322	159,517
	Untergrenze	20,322	1,000	20,322	159,517
Zeit * AGE2	Sphärizität angenommen	,522	1	,522	4,097
	Greenhouse-Geisser	,522	1,000	,522	4,097
	Huynh-Feldt (HF)	,522	1,000	,522	4,097
	Untergrenze	,522	1,000	,522	4,097
Fehler(Zeit)	Sphärizität angenommen	29,938	235	,127	
	Greenhouse-Geisser	29,938	235,000	,127	
	Huynh-Feldt (HF)	29,938	235,000	,127	
	Untergrenze	29,938	235,000	,127	

Tests der Innersubjekteffekte

Maß: MASS_1

Quelle		Sig.	Partielles Eta-Quadrat
Zeit	Sphärizität angenommen	,000	,404
	Greenhouse-Geisser	,000	,404
	Huynh-Feldt (HF)	,000	,404
	Untergrenze	,000	,404
Zeit * AGE2	Sphärizität angenommen	,044	,017
	Greenhouse-Geisser	,044	,017
	Huynh-Feldt (HF)	,044	,017
	Untergrenze	,044	,017
Fehler(Zeit)	Sphärizität angenommen		
	Greenhouse-Geisser		
	Huynh-Feldt (HF)		
	Untergrenze		

Tests der Innersubjektkontraste

Maß: MASS_1

Quelle	Zeit	Typ III Quadratsumme	df	Mittel der Quadrate	F	Sig.
Zeit	Linear	20,322	1	20,322	159,517	,000
Zeit * AGE2	Linear	,522	1	,522	4,097	,044
Fehler(Zeit)	Linear	29,938	235	,127		

Tests der Innersubjektkontraste

Maß: MASS_1

Quelle	Zeit	Partielles Eta-Quadrat
Zeit	Linear	,404
Zeit * AGE2	Linear	,017
Fehler(Zeit)	Linear	

Levene-Test auf Gleichheit der Fehlervarianzen[a]

		Levene-Statistik	df1	df2	Sig.
ALL_pre	Basiert auf dem Mittelwert	,172	1	235	,679
	Basiert auf dem Median	,196	1	235	,658
	Basierend auf dem Median und mit angepaßten df	,196	1	234,753	,658
	Basiert auf dem getrimmten Mittel	,205	1	235	,652
ALL_post	Basiert auf dem Mittelwert	,546	1	235	,461
	Basiert auf dem Median	,770	1	235	,381
	Basierend auf dem Median und mit angepaßten df	,770	1	233,961	,381
	Basiert auf dem getrimmten Mittel	,595	1	235	,441

Prüft die Nullhypothese, dass die Fehlervarianz der abhängigen Variablen über Gruppen hinweg gleich ist.

a. Design: Konstanter Term + AGE2
Innersubjektdesign: Zeit

Tests der Zwischensubjekteffekte

Maß: MASS_1

Transformierte Variable: Mittel

Quelle	Typ III Quadratsumme	df	Mittel der Quadrate	F	Sig.
Konstanter Term	1919,145	1	1919,145	1954,458	,000
AGE2	9,735	1	9,735	9,914	,002
Fehler	230,754	235	,982		

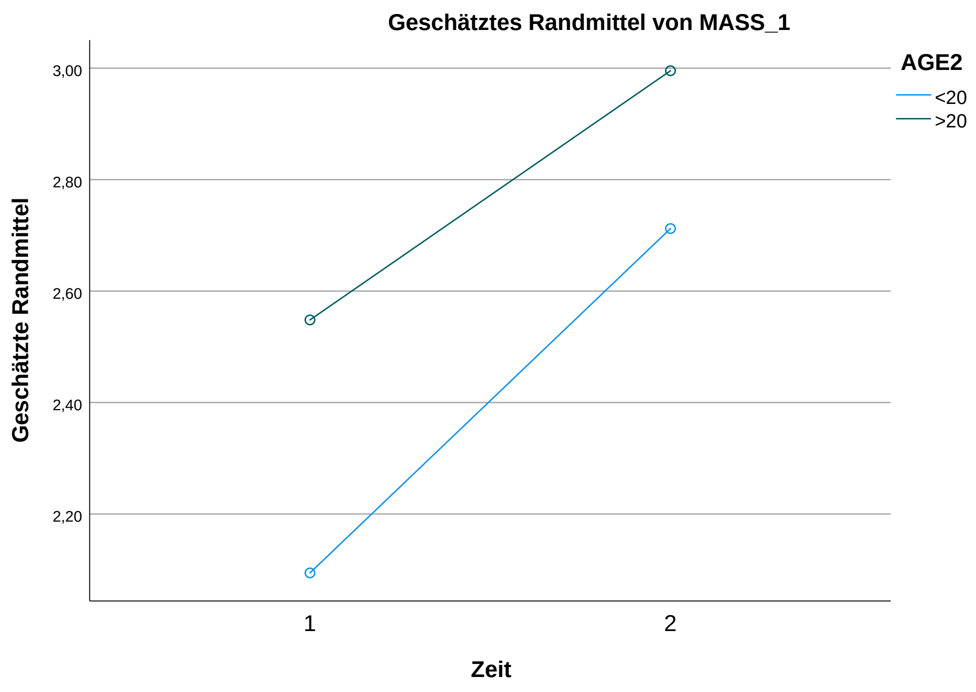
Tests der Zwischensubjekteffekte

Maß: MASS_1

Transformierte Variable: Mittel

Quelle	Partielles Eta-Quadrat
Konstanter Term	,893
AGE2	,040
Fehler	

Profilplots




```
RECODE Education (1=1) (2=1) (3=2) (4=3) (6=3) (5=1) (7=3) INTO Edu14.
EXECUTE.
GLM ALL_pre ALL_post BY Edu14
```

```
/WSFACTOR=Zeit 2 Polynomial
/METHOD=SSTYPE(3)
/PLOT=PROFILE(Zeit*Edu14) TYPE=LINE ERRORBAR=NO MEANREFERENCE=NO YAXIS=A
UTO
/PRINT=DESCRIPTIVE ETASQ HOMOGENEITY
/CRITERIA=ALPHA(.05)
/WSDESIGN=Zeit
/DESIGN=Edu14.
```
** MIXED ANOVA für Education**

Allgemeines lineares Modell

Hinweise

Ausgabe erstellt		25-MAR-2025 14:20:43
Kommentare		
Eingabe	Daten	/Users/janschlueter/sciebo - Schlüter, Jan Steffen (j23s00908@hs-bochum.de)@hs-bochum.sciebo.de/Paper Digitalkompetenzen mit HRW Hellwig/Fragebogenauswertung_DIE-Impact-bereinigt.sav
	Aktiver Datensatz	DataSet1
	Filter	ALL_pre < 4.1 & ALL_post < 4.95 (FILTER)
	Gewichtung	<keine>
	Aufgeteilte Datei	<keine>
	Anzahl der Zeilen in der Arbeitsdatei	237
Behandlung fehlender Werte	Definition für "fehlend"	Benutzerdefinierte fehlende Werte gelten als fehlend.
	Verwendete Fälle	Die Statistik basiert auf allen Fällen mit gültigen Daten für alle Variablen im Modell.

Hinweise

Syntax		GLM ALL_pre ALL_post BY Edu16 /WSFACTOR=Zeit 2 Polynomial /METHOD=SSTYPE(3) /PLOT=PROFILE (Zeit*Edu16) TYPE=LINE ERRORBAR=NO MEANREFERENCE=NO YAXIS=AUTO /PRINT=DESCRIPTIVE ETASQ HOMOGENEITY /CRITERIA=ALPHA(.05) /WSDESIGN=Zeit /DESIGN=Edu16.
Ressourcen	Prozessorzeit	00:00:00,16
	Verstrichene Zeit	00:00:00,00

Innersubjektfaktoren

Maß: MASS_1

Zeit	Abhängige Variable
1	ALL_pre
2	ALL_post

Zwischensubjektfaktoren

		N
Edu16	1,00	128
	2,00	107

Deskriptive Statistiken

	Edu16	Mittelwert	Standardabweichung	N
ALL_pre	1,00	1,9524	,70987	128
	2,00	2,4632	,71050	107
	Gesamt	2,1850	,75309	235
ALL_post	1,00	2,6043	,74884	128
	2,00	2,9623	,73606	107
	Gesamt	2,7673	,76269	235

Box-Test auf Gleichheit der Kovarianz-Matrizen[a]

Box' M	4,317
F	1,426
df1	3
df2	304908694,4
Sig.	,233

Prüft die Nullhypothese, dass die beobachteten Kovarianzen- matrizen der abhängigen Variablen über die Gruppen gleich sind.

a. Design: Konstanter Term + Edu16

Innersubjektdesign: Zeit

Multivariate Tests[a]

Effekt		Wert	F	Hypothese df	Fehler df
Zeit	Pillai-Spur	,566	304,171[b]	1,000	233,000
	Wilks-Lambda	,434	304,171[b]	1,000	233,000
	Hotelling-Spur	1,305	304,171[b]	1,000	233,000
	Größte charakteristische Wurzel nach Roy	1,305	304,171[b]	1,000	233,000
Zeit * Edu16	Pillai-Spur	,022	5,359[b]	1,000	233,000
	Wilks-Lambda	,978	5,359[b]	1,000	233,000
	Hotelling-Spur	,023	5,359[b]	1,000	233,000
	Größte charakteristische Wurzel nach Roy	,023	5,359[b]	1,000	233,000

Multivariate Tests[a]

Effekt		Sig.	Partielles Eta-Quadrat
Zeit	Pillai-Spur	,000	,566
	Wilks-Lambda	,000	,566
	Hotelling-Spur	,000	,566
	Größte charakteristische Wurzel nach Roy	,000	,566
Zeit * Edu16	Pillai-Spur	,021	,022
	Wilks-Lambda	,021	,022
	Hotelling-Spur	,021	,022
	Größte charakteristische Wurzel nach Roy	,021	,022

a. Design: Konstanter Term + Edu16
Innersubjektdesign: Zeit

b. Exakte Statistik

Mauchly-Test auf Sphärizität[a]

Maß: MASS_1

Innersubjekteffekt	Mauchly-W	Ungefähres Chi-Quadrat	df	Sig.	Epsilon[b] Greenhouse-Geisser
Zeit	1,000	,000	0	.	1,000

Mauchly-Test auf Sphärizität[a]

Maß: MASS_1

Innersubjekteffekt	Epsilon[b] Huynh-Feldt (HF)	Untergrenze
Zeit	1,000	1,000

Prüft die Nullhypothese, dass sich die Fehlerkovarianz-Matrix der orthonormalisierten transformierten abhängigen Variablen proportional zur Einheitsmatrix verhält.

a. Design: Konstanter Term + Edu16
Innersubjektdesign: Zeit

b. Kann zum Korrigieren der Freiheitsgrade für die gemittelten Signifikanztests verwendet werden. In der Tabelle mit den Tests der Effekte innerhalb der Subjekte werden korrigierte Tests angezeigt.

Tests der Innersubjekteffekte

Maß: MASS_1

Quelle		Typ III Quadratsumme	df	Mittel der Quadrate	F
Zeit	Sphärizität angenommen	38,605	1	38,605	304,171
	Greenhouse-Geisser	38,605	1,000	38,605	304,171
	Huynh-Feldt (HF)	38,605	1,000	38,605	304,171
	Untergrenze	38,605	1,000	38,605	304,171
Zeit * Edu16	Sphärizität angenommen	,680	1	,680	5,359
	Greenhouse-Geisser	,680	1,000	,680	5,359
	Huynh-Feldt (HF)	,680	1,000	,680	5,359
	Untergrenze	,680	1,000	,680	5,359
Fehler(Zeit)	Sphärizität angenommen	29,572	233	,127	
	Greenhouse-Geisser	29,572	233,000	,127	
	Huynh-Feldt (HF)	29,572	233,000	,127	
	Untergrenze	29,572	233,000	,127	

Tests der Innersubjekteffekte

Maß: MASS_1

Quelle		Sig.	Partielles Eta-Quadrat
Zeit	Sphärizität angenommen	,000	,566
	Greenhouse-Geisser	,000	,566
	Huynh-Feldt (HF)	,000	,566
	Untergrenze	,000	,566
Zeit * Edu16	Sphärizität angenommen	,021	,022
	Greenhouse-Geisser	,021	,022
	Huynh-Feldt (HF)	,021	,022
	Untergrenze	,021	,022
Fehler(Zeit)	Sphärizität angenommen		
	Greenhouse-Geisser		
	Huynh-Feldt (HF)		
	Untergrenze		

Tests der Innersubjektkontraste

Maß: MASS_1

Quelle	Zeit	Typ III Quadratsumme	df	Mittel der Quadrate	F	Sig.
Zeit	Linear	38,605	1	38,605	304,171	,000
Zeit * Edu16	Linear	,680	1	,680	5,359	,021
Fehler(Zeit)	Linear	29,572	233	,127		

Tests der Innersubjektkontraste

Maß: MASS_1

Quelle	Zeit	Partielles Eta-Quadrat
Zeit	Linear	,566
Zeit * Edu16	Linear	,022
Fehler(Zeit)	Linear	

Levene-Test auf Gleichheit der Fehlervarianzen[a]

		Levene-Statistik	df1	df2	Sig.
ALL_pre	Basiert auf dem Mittelwert	,005	1	233	,947
	Basiert auf dem Median	,000	1	233	,992
	Basierend auf dem Median und mit angepaßten df	,000	1	232,981	,992
	Basiert auf dem getrimmten Mittel	,008	1	233	,928
ALL_post	Basiert auf dem Mittelwert	,254	1	233	,615
	Basiert auf dem Median	,331	1	233	,566
	Basierend auf dem Median und mit angepaßten df	,331	1	231,571	,566
	Basiert auf dem getrimmten Mittel	,257	1	233	,612

Prüft die Nullhypothese, dass die Fehlervarianz der abhängigen Variablen über Gruppen hinweg gleich ist.

a. Design: Konstanter Term + Edu16
Innersubjektdesign: Zeit

Tests der Zwischensubjekteffekte

Maß: MASS_1

Transformierte Variable: Mittel

Quelle	Typ III Quadratsumme	df	Mittel der Quadrate	F	Sig.
Konstanter Term	2903,663	1	2903,663	3123,804	,000
Edu16	21,996	1	21,996	23,664	,000
Fehler	216,580	233	,930		

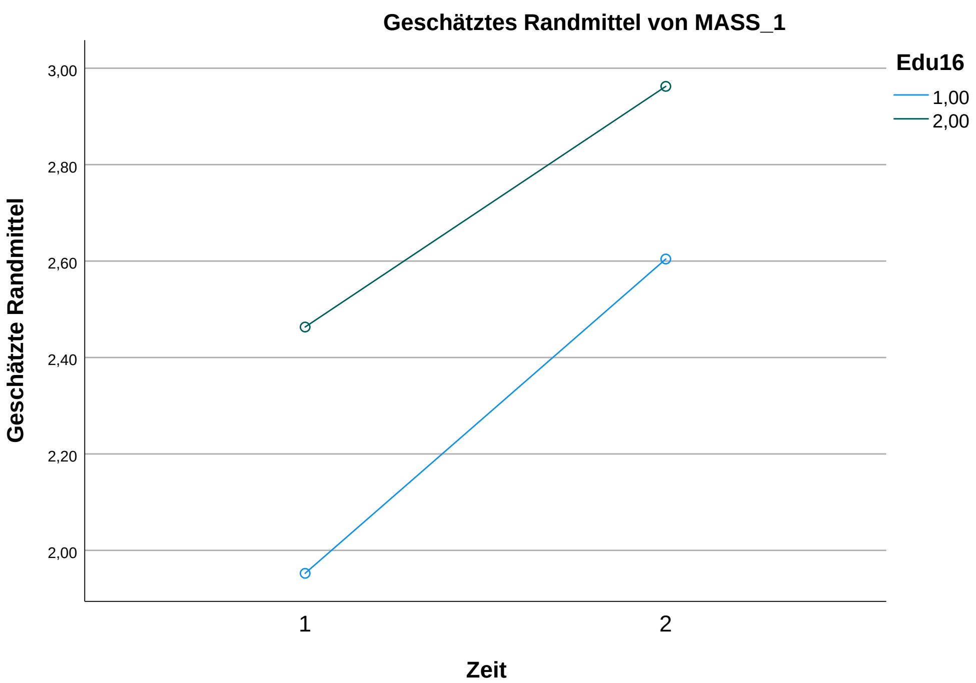
Tests der Zwischensubjekteffekte

Maß: MASS_1

Transformierte Variable: Mittel

Quelle	Partielles Eta-Quadrat
Konstanter Term	,931
Edu16	,092
Fehler	

Profilplots



Kompetenzen	Alle Mittelwert	Std.-Abweichun	T	df	Zweiseitiges p	Effektgröße Punktschätzung /
a	0.534	0.742	11.015	233	0.000	0.720
b	0.625	0.722	13.187	231	0.000	0.866
c	0.538	0.696	11.970	239	0.000	0.773
d	0.500	0.704	10.955	237	0.000	0.710
e	0.715	0.716	15.310	234	0.000	0.999
f	0.504	0.728	10.689	237	0.000	0.693
g	0.500	0.776	9.979	239	0.000	0.644
h	0.647	0.775	12.880	237	0.000	0.835
i	0.757	0.799	14.654	238	0.000	0.948
j	0.772	0.736	16.160	236	0.000	1.050
k	0.683	0.828	12.782	239	0.000	0.825
l	0.532	0.734	11.157	236	0.000	0.725
m	0.611	0.796	11.864	238	0.000	0.767
n	0.521	0.776	10.399	239	0.000	0.671

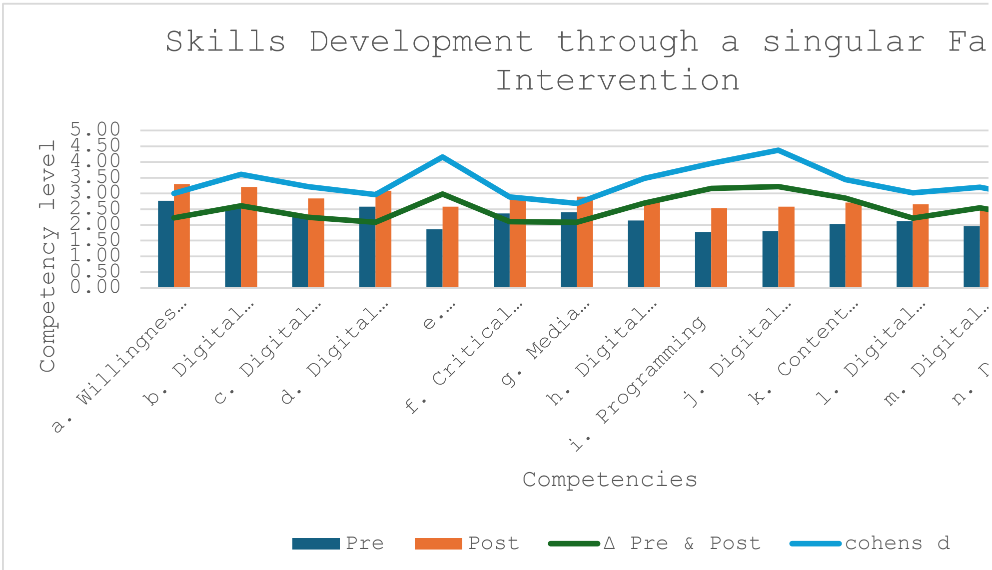
Die a-Kompetenz-Werte waren signifikant höher nach der Interventio

>0,2 = kleiner
>0,5 = mittlere
>0,8 = großer

a. Willingnes to Learn
b. Digital Learning
c. Digital Coaching
d. Digital Information Seeking
e. Understanding Digital Transformation
f. Critical Thinking
g. Media Analysis
h. Digital Problem Solving
i. Programming
j. Digital Innovating
k. Content Creation
l. Digital Interaction
m. Digital Collaboration & Cooperation
n. Digital Presenting

	Pre	Standard dev	Post	Sandartabwe	Δ Pre & Post	Sandartabwe
a. Willingnes	2.77	1.059	3.30	0.925	0.534	0.742
b. Digital Lea	2.58	1.082	3.20	0.966	0.625	0.722
c. Digital Coa	2.31	1.069	2.85	0.992	0.538	0.696
d. Digital Info	2.58	1.166	3.08	1.009	0.500	0.704
e. Understand	1.86	0.942	2.58	0.994	0.715	0.716
f. Critical Thi	2.37	1.078	2.87	1.057	0.504	0.728
g. Media Ana	2.40	1.062	2.90	1.038	0.500	0.776

h. Digital Pro	2.14	1.009	2.79	0.997	0.647	0.775
i. Programmin	1.78	1.019	2.54	1.064	0.757	0.799
j. Digital Inno	1.81	0.932	2.58	1.029	0.772	0.736
k. Content Cr	2.03	1.033	2.71	1.045	0.683	0.828
l. Digital Inte	2.12	0.990	2.65	0.986	0.532	0.734
m. Digital Co	1.97	0.970	2.58	1.066	0.611	0.796
n. Digital Pre	2.20	1.008	2.73	0.993	0.521	0.776



[redacted]

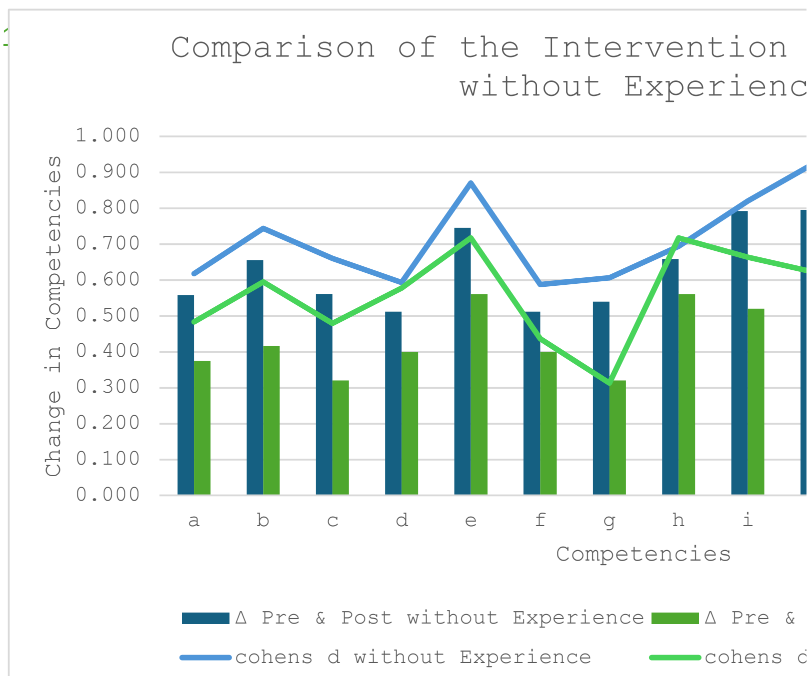
ohne Erfahrung

	Δ Pre & Post	Std.-Abweichun	T	df	Zweiseitige s p
a	0.558	0.753	10.684	207	0.000
b	0.655	0.734	12.810	205	0.000
c	0.561	0.708	11.589	213	0.000
d	0.512	0.720	10.333	210	0.000
e	0.745	0.714	15.055	207	0.000
f	0.512	0.726	10.239	210	0.000
g	0.540	0.743	10.611	212	0.000
h	0.659	0.791	12.096	210	0.000
i	0.792	0.805	14.326	211	0.000
j	0.795	0.713	16.167	209	0.000
k	0.728	0.802	13.250	212	0.000
l	0.557	0.744	10.846	209	0.000
m	0.632	0.771	11.943	211	0.000
n	0.545	0.767	10.358	212	0.000

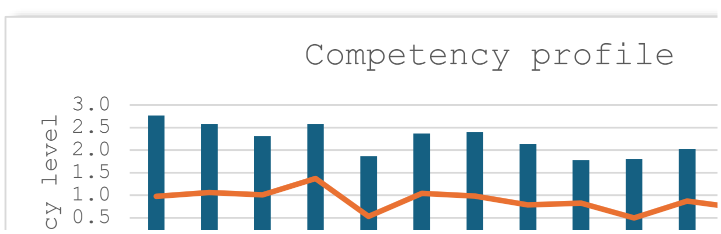
0.628

n der Katzenvideos, *t* (233) = 1

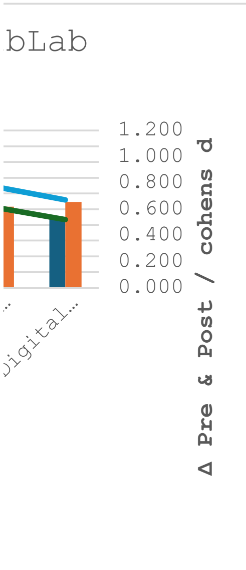
· Effekt
er Effekt
· Effekt

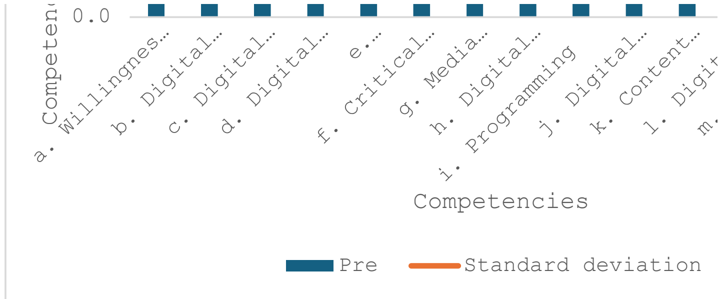


cohens d
0.720
0.866
0.773
0.710
0.999
0.693
0.644



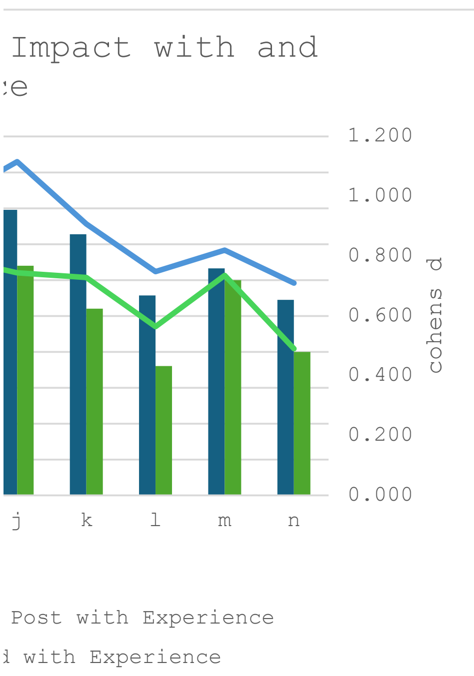
0.835
0.948
1.050
0.825
0.725
0.767
0.671

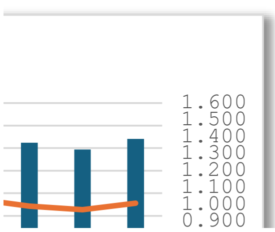




cohens d without
0.741
0.892
0.792
0.711
1.044
0.705
0.727
0.833
0.984
1.116
0.908
0.748
0.820
0.710

	mit Erfahrung Δ Pre & Post with	Std.-Abweichun	T	df
a	0.375	0.647	2.840	23
b	0.417	0.584	3.498	23
c	0.320	0.557	2.874	24
d	0.400	0.577	3.464	24
e	0.560	0.651	4.303	24
f	0.400	0.764	2.619	24
g	0.320	0.852	1.877	24
h	0.560	0.651	4.303	24
i	0.520	0.653	3.980	24
j	0.640	0.860	3.720	24
k	0.520	0.714	3.641	24
l	0.360	0.638	2.823	24
m	0.600	0.816	3.674	24
n	0.400	0.816	2.449	24
	0.457			



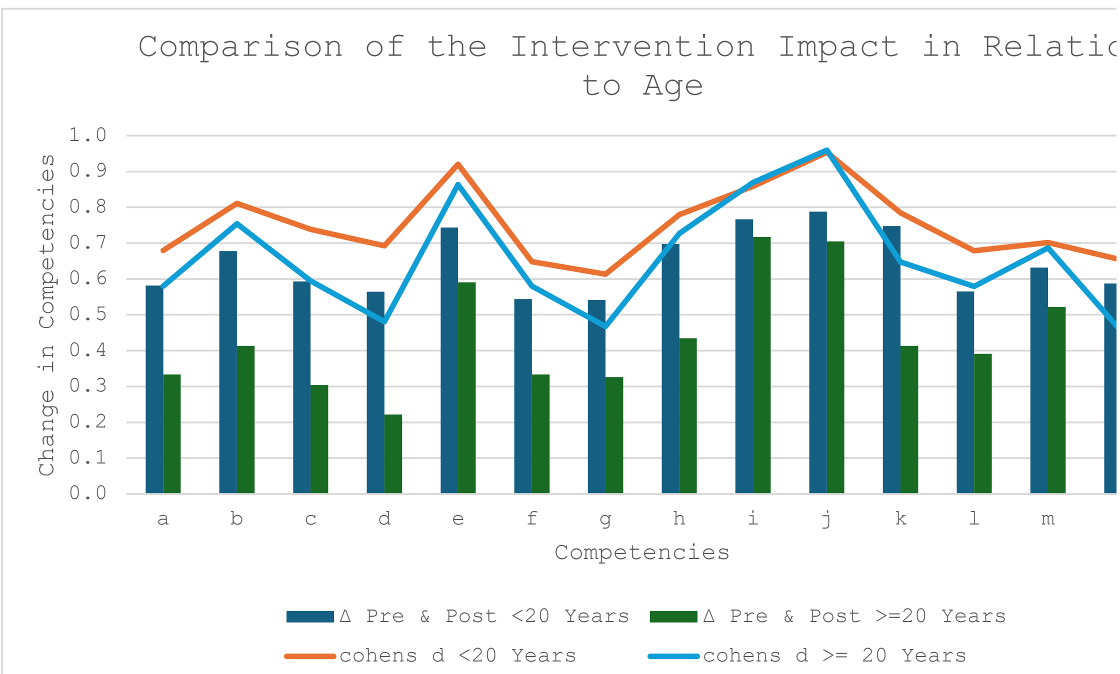



0.800
Digital…
Digital…

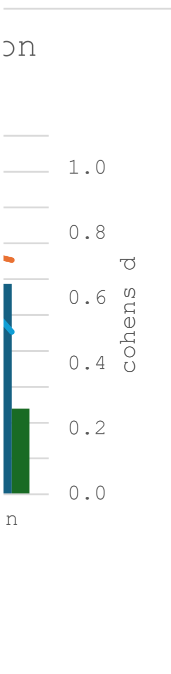
Zweiseitiges p	cohens d with	[redacted]		unter 20Jahre Δ Pre & Post <20	Std.-Abweichun	T
0.009	0.580		a	0.582	0.779	10.276
0.002	0.714		b	0.677	0.759	12.168
0.008	0.575		c	0.593	0.730	11.311
0.002	0.693		d	0.565	0.741	10.588
0.000	0.861		e	0.743	0.734	13.994
0.015	0.524		f	0.544	0.763	9.901
0.073	0.375		g	0.541	0.802	9.399
0.000	0.861		h	0.698	0.814	11.884
0.001	0.796		i	0.767	0.812	13.124
0.001	0.744		j	0.788	0.751	14.569
0.001	0.728		k	0.747	0.866	12.026
0.009	0.565		l	0.565	0.757	10.321
0.001	0.735		m	0.632	0.819	10.719
0.022	0.490		n	0.588	0.818	10.011
				0.645		

df	Zweiseitiges p	cohens d <20 Years		über 20 Jahre Δ Pre & Post >=20
188	0.000	0.747	a	0.333
185	0.000	0.892	b	0.413
193	0.000	0.812	c	0.304
192	0.000	0.762	d	0.222
190	0.000	1.013	e	0.591
192	0.000	0.713	f	0.333
193	0.000	0.675	g	0.326
191	0.000	0.858	h	0.435
192	0.000	0.945	i	0.717
192	0.000	1.049	j	0.705
193	0.000	0.863	k	0.413
190	0.000	0.747	l	0.391
192	0.000	0.772	m	0.522
193	0.000	0.719	n	0.239

0.425



Std.-Abweichun	T	df	Zweiseitiges p	cohens d >= 20	[redacted]	
0.522	4.282	44	0.000	0.638		a
0.498	5.627	45	0.000	0.830		b
0.465	4.437	45	0.000	0.654		c
0.420	3.546	44	0.001	0.529		d
0.622	6.302	43	0.000	0.950		e
0.522	4.282	44	0.000	0.638		f
0.634	3.486	45	0.001	0.514		g
0.544	5.423	45	0.000	0.800		h
0.750	6.486	45	0.000	0.956		i
0.668	7.001	43	0.000	1.055		j
0.580	4.828	45	0.000	0.712		k
0.614	4.323	45	0.000	0.637		l
0.691	5.122	45	0.000	0.755		m
0.480	3.379	45	0.002	0.498		n

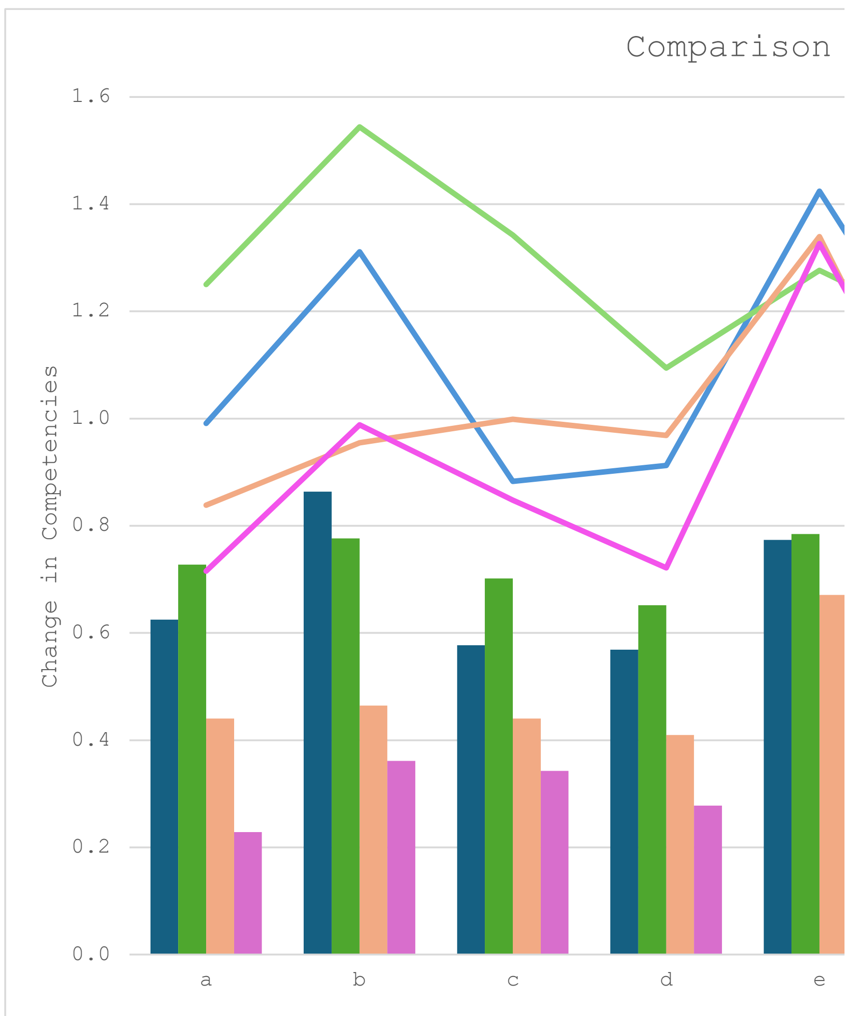


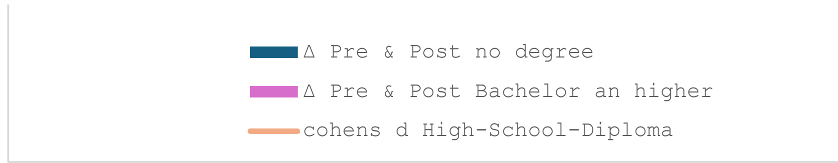
a. Willingnes to Learn
b. Digital Learning
c. Digital Coaching
d. Digital Information Seeking
e. Understanding Digital Transformation
f. Critical Thinking
g. Media Analysis
h. Digital Problem Solving
i. Programming
j. Digital Innovating
k. Content Creation
l. Digital Interaction
m. Digital Collaboration & Cooperation
n. Digital Presenting

Ohne Abschluss

Δ Pre & Post no	Std.-Abweichun	T	df	Zweiseitiges p		cohens d no degree
0.625	0.841	5.148	47	0.000		0.743
0.864	0.878	6.521	43	0.000		0.983
0.577	0.871	4.776	51	0.000		0.662
0.569	0.831	4.888	50	0.000		0.684
0.774	0.724	7.775	52	0.000		1.068
0.588	0.804	5.222	50	0.000		0.731
0.509	0.775	4.784	52	0.000		0.657
0.725	0.827	6.268	50	0.000		0.878
0.660	0.854	5.632	52	0.000		0.774
0.784	0.673	8.326	50	0.000		1.166
0.717	1.063	4.911	52	0.000		0.675
0.686	0.761	6.437	50	0.000		0.901
0.580	0.950	4.319	49	0.000		0.611
0.588	0.779	5.392	50	0.000		0.755

0.661



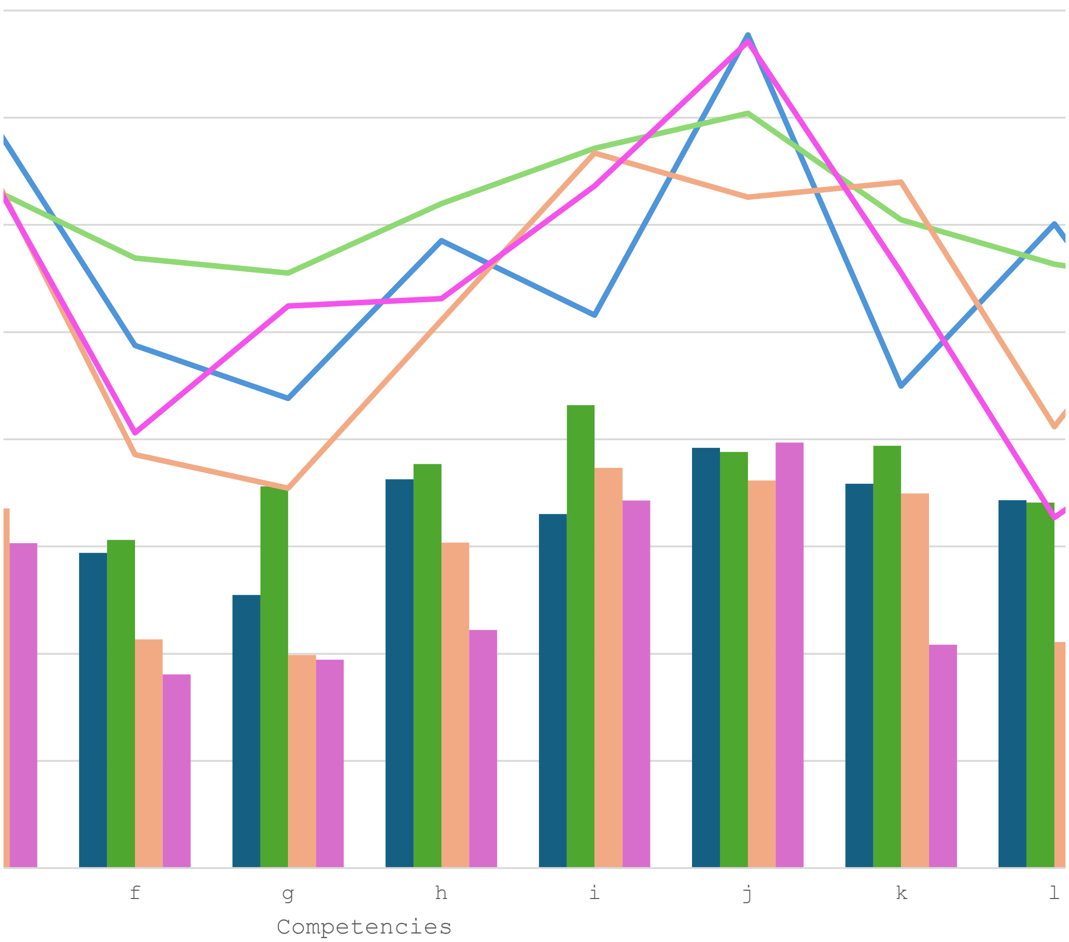

Δ Pre & Post no degree
Δ Pre & Post Bachelor an higher
cohens d High-School-Diploma

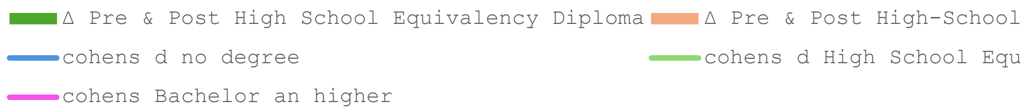
Hauptschulabschluss

	Δ Pre & Post High	Std.-Abweichun	T	df	Zweiseitige s p	cohens d High
a	0.727	0.775	7.619	65	0.000	0.938
b	0.776	0.670	9.480	66	0.000	1.158
c	0.701	0.697	8.242	66	0.000	1.007
d	0.652	0.794	6.666	65	0.000	0.820
e	0.785	0.820	7.719	64	0.000	0.957
f	0.612	0.717	6.988	66	0.000	0.854
g	0.712	0.855	6.765	65	0.000	0.833
h	0.754	0.811	7.497	64	0.000	0.930
i	0.864	0.857	8.184	65	0.000	1.007
j	0.776	0.735	8.645	66	0.000	1.056
k	0.788	0.869	7.370	65	0.000	0.907
l	0.682	0.807	6.865	65	0.000	0.845
m	0.657	0.808	6.652	66	0.000	0.813
n	0.687	0.908	6.189	66	0.000	0.756

0.727

of the Intervention Impact in Relation to Age

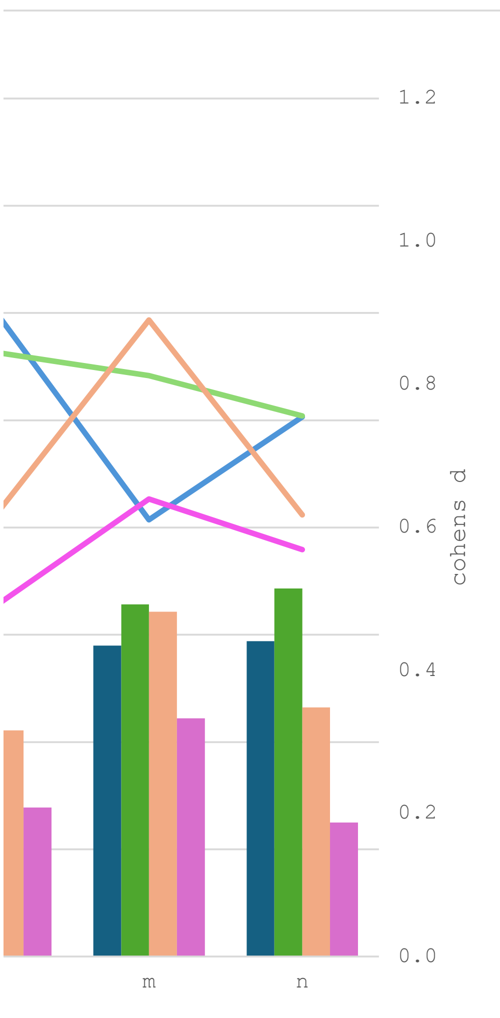



Δ Pre & Post High School Equivalency Diploma
Δ Pre & Post High-School
cohens d no degree
cohens d High School Equ
cohens Bachelor an higher

mittlere Reife

	Δ Pre & Post High-	Std.-Abweichun	T	df	Zweiseitiges p
a	0.440	0.700	5.765	83	0.000
b	0.464	0.648	6.563	83	0.000
c	0.440	0.588	6.865	83	0.000
d	0.410	0.564	6.618	82	0.000
e	0.671	0.668	9.097	81	0.000
f	0.427	0.738	5.241	81	0.000
g	0.398	0.748	4.843	82	0.000
h	0.607	0.792	7.028	83	0.000
i	0.747	0.746	9.117	82	0.000
j	0.723	0.770	8.552	82	0.000
k	0.699	0.728	8.744	82	0.000
l	0.422	0.683	5.626	82	0.000
m	0.643	0.722	8.159	83	0.000
n	0.464	0.752	5.661	83	0.000

0.540



-Diploma
ivalency Diploma

Abitur und höhe

cohens d High-		Δ Pre & Post	Std.-Abweichun	T	df
0.629	a	0.229	0.426	3.174	34
0.716	b	0.361	0.487	4.448	35
0.749	c	0.343	0.539	3.762	34
0.726	d	0.278	0.513	3.247	35
1.005	e	0.606	0.609	5.714	32
0.579	f	0.361	0.593	3.654	35
0.532	g	0.389	0.494	4.719	35
0.767	h	0.444	0.558	4.781	35
1.001	i	0.686	0.718	5.648	34
0.939	j	0.794	0.687	6.744	33
0.960	k	0.417	0.500	5.000	35
0.617	l	0.278	0.566	2.943	35
0.890	m	0.444	0.695	3.839	35
0.618	n	0.250	0.439	3.416	35

0.420

Zweiseitiges p	cohens Bachelor
0.003	0.536
0.000	0.741
0.001	0.636
0.003	0.541
0.000	0.995
0.001	0.609
0.000	0.787
0.000	0.797
0.000	0.955
0.000	1.157
0.000	0.833
0.006	0.491
0.000	0.640
0.002	0.569

	Date	Nr.	Age	Education	Experience	a_pre	b_pre	c_pre
1	2/17/2020	1	1	2	0	1	1	1
2	2/17/2020	2	1	1	0	1	1	1
3	2/17/2020	3	1	2	0	2	1	1
4	2/17/2020	4	1	1	0	3	2	1
5	2/17/2020	5	1	1	0	1	1	1
6	2/17/2020	6	1	2	0	2	2	2
7	2/17/2020	7	1	1	0	3	2	1
8	2/17/2020	8	1	2	0	2	2	1
9	2/17/2020	9	1	1	0	3	2	1
10	2/17/2020	10	1	1	0	1	1	2
11	2/17/2020	11	1	1	0	1	1	1
12	2/18/2020	1	1	3	0	4	4	4
13	2/18/2020	2	1	2	0	2	2	1
14	2/18/2020	3	1	1	0	2	3	2
15	2/18/2020	4	1	1	0	1	1	1
16	2/18/2020	5	1	2	0	2	2	2
17	2/18/2020	6	1	2	0	2	3	3
18	2/18/2020	7	1	1	0	2	3	3
19	2/18/2020	8	1	3	0	4	3	4
20	2/18/2020	9	2	3	0	1	1	1
21	2/18/2020	10	1	2	0	1	2	1
22	2/18/2020	11	1	1	0	1	1	1
23	2/18/2020	12	1	1	0	2	1	1
24	2/18/2020	13	1	1	0	3	2	2
25	2/18/2020	14	1	1	0	3	2	2
26	3/2/2020	1	1	3	0	3	1	1
27	3/2/2020	2	1	2	0	2	1	2
28	3/2/2020	3	1	3	0	3	3	3
29	3/2/2020	4	1	1	0	3	3	3
30	3/2/2020	5	2	3	0	3	2	1
31	3/2/2020	6	1	3	0	2	2	3
32	3/2/2020	7	1	2	1	3	4	2
33	3/2/2020	8	1	3	0	4	3	2
34	3/2/2020	9	1	1	0	4	3	2
35	3/3/2022	1	1	2	0	2	1	2
36	3/3/2022	2	1	2	0	3	2	
37	3/3/2022	3	1	2	0	1	1	1
38	3/3/2022	4	1	1	0	3	2	1
39	3/3/2022	5	1	1	0	1	1	1
40	3/3/2022	6	1	2	0	3	1	1
41	3/3/2022	7	1	5	0	3	3	2
42	3/3/2022	8	1	2	0	2	1	2
43	3/3/2022	9	1	1	0			3
44	3/9/2020	1	2	5	0	1	1	1
45	3/9/2020	2	1	1	0	1	1	1
46	3/9/2020	3	1	1	0	1	2	2
47	3/9/2020	4	1	1	0	1	2	2
48	3/9/2020	5	1	1	0	4	4	1

49	3/9/2020	6	1	1	0	1		1
50	3/9/2020	7	1	2	0	3	3	3
51	3/9/2020	8	1	2	1	2	2	2
52	3/9/2020	9	1	3	0	1	1	1
53	3/9/2020	10	1	2	0	2	3	3
54	3/9/2020	11	1	1	0	3	2	1
55	3/9/2020	12	1	3	0	4	4	3
56	3/9/2020	13	1	3	0	1	1	3
57	3/9/2020	14	1	2	0	2	2	2
58	3/10/2020	1	1	2	0	2	1	1
59	3/10/2020	2	1	2	0			
60	3/10/2020	3	1	2	0	2	2	1
61	3/10/2020	4	1	2	0	2	1	2
62	3/10/2020	5	1	2	0	2	2	1
63	3/10/2020	6	1	2	0	1	1	1
64	3/10/2020	7	1	3	0	3	3	3
65	3/10/2020	8	1	3	0	3	3	2
66	3/10/2020	9	2	4	0	4	4	2
67	3/10/2020	10	1	2	0	2	1	1
68	3/10/2020	11	1	1	0	2	2	4
69	3/10/2020	12	1	3	1	3	4	3
70	3/10/2020	13	1	2	0	1	1	2
71	3/10/2020	14	1	2	0	2	2	1
72	7/5/2022	1	1	1	0	2	2	2
73	7/5/2022	2	1	3	0	3	3	2
74	7/5/2022	3	1	1	0	1	1	1
75	7/5/2022	4	4	5	0	2	1	1
76	7/5/2022	5	2	2	0	3	2	3
77	7/5/2022	6	5	7	0	3	2	1
78	7/5/2022	7	1	3	0	1	2	2
79	7/5/2022	8	2	3	0	2	3	3
80	7/5/2022	9	1	2	0	3	2	2
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82	7/5/2022	11	1	2	0	2	4	2
83	11/3/2022	1	1	3	0	3	3	1
84	11/3/2022	2	1	3	0	3	2	1
85	11/3/2022	3	2	4	0	2	3	3
86	11/3/2022	4	1	2	0	1	2	2
87	11/3/2022	5	1	3	0	2	2	2
88	11/3/2022	6	1	1	0	2	3	2
89	11/3/2022	7	1	2	0	3	3	3
90	11/3/2022	8	1	3	0	4	1	4
91	11/3/2022	9	1	1	0	1	2	1
92	11/3/2022	10	1	3	0	1	1	1
93	11/3/2022	11	1	2	0	3	3	3
94	11/3/2022	12	1	2	0	1	1	1
95	11/3/2022	13	1	2	0	3	3	3
96	11/3/2022	14	1	2	0	1	1	1
97	11/3/2022	15	1	2	0	3	2	1

98	11/3/2022	16	2	3	0	3	3	3
99	11/3/2022	17	1	1	0	3	2	2
100	11/3/2022	18	2	4	0	3	2	2
101	11/9/2022	1	1	2	0	3	4	3
102	11/9/2022	2	5	6	0	4	4	3
103	11/9/2022	3	1	1	0	2	1	4
104	11/9/2022	4	1	1	0		1	4
105	11/9/2022	5	1	1	0	3	1	3
106	11/9/2022	6	1	2	0	3	2	2
107	11/9/2022	7	1	3	0	5	3	4
108	11/9/2022	8	2	5	0		2	2
109	11/9/2022	9	0	1		3	3	2
110	11/10/2022	1	2	1	0	5	3	5
111	11/10/2022	2	1	1	0	2	2	1
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113	11/10/2022	4	2	3	0	3	2	2
114	11/10/2022	5	1	3	0	4	2	2
115	11/10/2022	6	4	4	0	4	4	4
116	11/10/2022	7	1	3	0	3	3	3
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118	11/10/2022	9	1	2	0	3	3	4
119	11/10/2022	10	1	3	0	4	4	3
120	11/10/2022	11	1	3	0	3	3	3
121	11/10/2022	12	2	3	0	4	4	3
122	11/10/2022	13	2	4	0	4	4	2
123	11/10/2022	14	2	3	0	5	3	4
124	11/10/2022	15	1	3	0	3	4	4
125	11/10/2022	16	1	3	0	4	4	3
126	11/10/2022	17	1	3	0	4	5	3
127	11/10/2022	18	1	4	0	4	4	3
128	11/10/2022	19	1	3	0	2	3	2
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130	11/21/2022	1	3	5	0	4	4	3
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133	11/21/2022	4	1	2	0	2	1	2
134	11/21/2022	5	1	2	0	1	1	1
135	11/21/2022	6	1	2	0	1	2	3
136	11/21/2022	7	1	1		1	1	1
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138	11/21/2022	9	1	1	0	3	3	3
139	11/23/2022	1	1	1	0	1	1	1
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143	11/23/2022	5	1	1	0	3	2	1
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145	11/23/2022	7	1	1	0	4	5	5
146	11/23/2022	8	1	2	0	1	1	1

147	11/23/2022	9	1	2	0			
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149	11/23/2022	11	1	1	0			
150	11/23/2022	12	1	1	0			
151	11/23/2022	13	1	2	0	1	1	1
152	11/23/2022	14	1	2	0		2	1
153	11/23/2022	15	1	3	0	3	2	1
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156	11/24/2022	3	1	2	0	3	2	2
157	11/24/2022	4	1	3	0	3	2	2
158	11/24/2022	5	3	5	0	4	4	4
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167	11/24/2022	14	1	2	0	2	2	2
168	11/24/2022	15	2	2	0	3	2	1
169	11/24/2022	16	2	2	0	4	3	4
170	11/24/2022	17	1	4	0	4	4	4
171	11/24/2022	18	1	3	0	3	3	3
172	11/30/2022	1	1	2	0	2	1	2
173	11/30/2022	2	1	1		2	2	
174	11/30/2022	3	1	3	0	3	4	3
175	11/30/2022	4	1	1	0	3	2	3
176	11/30/2022	5	2	3	1	3	3	3
177	11/30/2022	6	5	5	0	4	2	2
178	11/30/2022	7	1	2	0	1	1	1
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183	12/1/2022	2	1	3	1	4	4	4
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186	12/1/2022	5	2	2	0	3	3	2
187	12/1/2022	6	1	3	0	3	4	3
188	12/1/2022	7	1	2	0	2	3	2
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190	12/1/2022	9	1	3	0	2	2	2
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192	12/1/2022	11	1	3	1	3	2	2
193	12/1/2022	12	1	3	1	5	4	4
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196	12/1/2022	15	1	3	1	3	2	2
197	12/1/2022	16	1	3	0	3	3	3
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199	12/1/2022	18	1	2	0	3	2	2
200	12/8/2022	1	1	3	1	3	3	3
201	12/8/2022	2	1	3	1	2	2	2
202	12/8/2022	3	2	2	1	2	2	2
203	12/8/2022	4	1	3	1	4	3	3
204	12/8/2022	5	1	3	0	2	2	2
205	12/8/2022	6	1	2	0	2	2	1
206	12/8/2022	7	1	2	0	1	1	1
207	12/8/2022	8	1	3	1	3	4	2
208	12/8/2022	9	1	3	0	3	4	2
209	12/8/2022	10	1	3	0	5	5	4
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211	12/8/2022	12	1	1	0	3		5
212	12/8/2022	13	1	3	0			
213	12/8/2022	14	1	3	0	5	2	1
214	12/8/2022	15	2	4	0			
215	12/8/2022	16	1	1	0	3	3	2
216	12/8/2022	17	1	1	1	3	3	3
217	12/8/2022	18	1	2	1	3	3	3
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220	1/16/2023	1	1	2	0	1	5	2
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222	1/16/2023	3	1	3	0	4	4	4
223	1/16/2023	4	1	1	0	3	2	1
224	1/16/2023	5	1	2	0	3	3	1
225	1/16/2023	6	1	3	0	3	3	2
226	1/16/2023	7	2	4	0	3	3	1
227	1/16/2023	8	1	2	0	1	1	2
228	1/16/2023	9	1	3	0	4	4	4
229	1/16/2023	10	1	2	0	2	2	2
230	1/16/2023	11	1	1	0	1	1	2
231	1/17/2023	1	1	2	0	4	4	4
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233	1/17/2023	3	1	2	0	2	3	4
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236	1/17/2023	6	1	3	0	3	4	4
237	1/17/2023	7	1	1	0	1	1	1
238	1/17/2023	8	2	3	0	3	3	3
239	1/17/2023	9	1	1	0	1	1	1
240	1/17/2023	10	1	3	0	2	2	2
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244	1/25/2023	1	2	4	0	4	3	3

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2	2	2	2	2	2	2	2	2	2	2	3	3	2	3	3
3	1	3	2	2	1	1	1	1	1	1	3	3	2	3	1
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4	2	3	4	3	3	2	4	4	4	4	4	3	3	4	2

5	3	3	4	3	3	3	4	3	4	3	5	5	5	5	4
4		3	3	3	4	3	3	3	3	3	4	4	1	4	
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3	2	3	2	3	4	3	3	3	3	3	3	3	3	3	2
4	4	4	3	2	2	2	2	3	2	4	3	4	2	4	4
5	3	4	4	2		1	4	3	3	3	4	4	5	5	3
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2	1	3	2	1	1	1	1	1	2	2	4	3	3	3	2
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4	4	4	3	4	4	3	3	2	3	2	4	4	3	4	4
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4	1	4	2	2	1		2	3	3	3	4	4	3	4	2
4	3	3	3	3	4	2	4	4	4	3	4	4	3	4	3
4	2	3	2	3	2	3	2	4	2	3	3	3	2	4	2

f_post	g_pos	h_pos	i_post	j_post	k_pos	l_post	m_po	n_post
2	2	2	2	2	2	2	2	2
1	2	2	2	2	2	2	2	2
1	2	1	1	1	1	1	1	2
2	3	3	3	0	3	3	2	3
2	2	3	2	2	3	2	3	1
3	3	5	3	5	3	2	3	3
2	2	2	2	2	2	2	2	2
3	2	3	2	1	1	2	2	2
2	3	3	2	2	3	2	3	3
2	2	1	1	2	2	2	1	2
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4	3	3	3	3	4	4	3	4
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3	3	2	3	2	2	2	2	2
1	2	2	2	2	2	1	1	1
2	4	3	3	3	3	3	2	3
2	2	1	1	1	2	1	1	1
2	2	1	1	1	2	1	1	1
2	1	2	2	2	2	1	3	2
2	3			2	2	3	2	2
3	3	3	3	3	3	3	3	3
2	2	2	2	3	3	3	3	3
1	1	1	1	1	1	1	1	1
		4	4	3	3	3	3	4
3	2	2	5	4	2	3	4	2
3	3	4	2	4	3	3	3	3
4	3	4	3	4	4	4	4	4
5	5	5	5	5	5	5	5	5
4	3	3	4	3	4	2	3	4
2	2	2	2	2	2	2	2	2
2	3	3	2	3	2	3	1	3
2	2	2	2	2	2	2	2	2
1	2	2	1	1	2	1	2	1
5	4	3	4	3	3	2	3	2
3	3	2	2	1	1	2	2	2
3	3	4	2	2	2	3	2	3
2	2	2	2	2	2	2	2	2
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5	4	3	4	3	3	2	3	3
3	2	2	2	3	3	2	2	3

	2		2		2			2
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5	4	3	1	4	3	2	3	3
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2	3	3	3	3	3	2	3	4
1	1	1	1	1	1	1	1	1
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4	3	2	2	3	2	3	2	2
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2	2	1	1	2	2	2	2	2
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3	1	2	3	3	3	2	2	2
3	3	2	2	2	2	2	2	2
3	3	4	3	3	3	3	3	3
5	3	4	2	3	2	2	3	2
3	4	2	2	2	2	2	1	2
2	2	2	1	1	1	2	1	2
3	4	4	3	4	4	3	3	3
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4	3	3	2	2	2	3	3	1
1	3	1	2	1	2	1	1	1
3	2	2	1	1	1	1	1	2

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3	3	3	2	2	2	3	2	3
4	4	4	2	2	3	4	2	2
2	4	4	3	2	2	1	2	3
4	4	2	2	2	3	2	3	
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3	4	3	4	3	3	2	1	2
3	3	2	2	3	3	3	2	3
3	2	3	2	3	1	2	1	2
	5	3	4	4	5	5	5	4
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3	4	4	4	4	4	4	4	4
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3	4	4	2	3	4			
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3	5	5	2	3	2	2	2	2
1	1	1	1	2	1	1	1	1

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3	3	3	2	3	3		3	3
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5	5	4	4	4	4	4	4	5
2	2	2	2	2	2		2	3
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3	3	2	1	1	2	2	2	3
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3	3	3	3	2	3	3	3	2
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4	4	4	4	3	2	3	4	4
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5	5	5	5	5	4	4	4	5
4	5	4	5	4	5	4	5	5
1	2	1	2	2	2	1	1	4
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3	3	3	3	3	3	3	3	3
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2	2	2	2	3	2	2	2	2
3	2	1	1	2	1	1	1	1
3	2	2	1	1	1	2	1	2
3	2	2	2	2	2	2	2	3
3	4	3	3	2	4	4	4	4

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3	3	3	4	4	4	3	3	3
3	3	4	3	3	3	3	4	3
3	3	3	4	4	3	3	3	3
4	3	2	2	2	2	3	2	4
4	4	2		1	4	3	3	3
4	4	5	5	4	4	4	5	4
3	3	2	1	1	1	1	2	2
3	3	3	3	4	2	3	3	3
2	4	4	4	4	5	3	3	4
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4	4	3	3	3	4	4	4	3
2	2	3	2	1	3	3	3	3
4	3	3	1		3	3	3	3
3	3	3	4	2	4	4	4	3
4	2	4	2	4	3	4	2	3

t-Test

Hinweise

Ausgabe erstellt		
Kommentare		
Eingabe	Daten	
	Aktiver Datensatz	
	Filter	
	Gewichtung	
	Aufgeteilte Datei	
	Anzahl der Zeilen in der Arbeitsdatei	
Behandlung fehlender Werte	Definition für "fehlend"	
	Verwendete Fälle	

Syntax		
Ressourcen	Prozessorzeit	
	Verstrichene Zeit	

Statistil

Paaren 1	a_post	
	a_pre	
Paaren 2	b_post	
	b_pre	
Paaren 3	c_post	
	c_pre	
Paaren 4	d_post	
	d_pre	
Paaren 5	e_post	
	e_pre	
Paaren 6	f_post	
	f_pre	
Paaren 7	g_post	
	g_pre	

Paaren 8	h_post
	h_pre
Paaren 9	i_post
	i_pre
Paaren 10	j_post
	j_pre
Paaren 11	k_post
	k_pre
Paaren 12	l_post
	l_pre
Paaren 13	m_post
	m_pre
Paaren 14	n_post
	n_pre

Korrelatio

Paaren 1	a_post & a_pre
Paaren 2	b_post & b_pre
Paaren 3	c_post & c_pre
Paaren 4	d_post & d_pre
Paaren 5	e_post & e_pre
Paaren 6	f_post & f_pre
Paaren 7	g_post & g_pre
Paaren 8	h_post & h_pre
Paaren 9	i_post & i_pre
Paaren 10	j_post & j_pre
Paaren 11	k_post & k_pre
Paaren 12	l_post & l_pre
Paaren 13	m_post & m_pre
Paaren 14	n_post & n_pre

Paaren 1	a_post - a_pre
Paaren 2	b_post - b_pre
Paaren 3	c_post - c_pre
Paaren 4	d_post - d_pre
Paaren 5	e_post - e_pre
Paaren 6	f_post - f_pre
Paaren 7	g_post - g_pre
Paaren 8	h_post - h_pre
Paaren 9	i_post - i_pre
Paaren 10	j_post - j_pre
Paaren 11	k_post - k_pre
Paaren 12	l_post - l_pre
Paaren 13	m_post - m_pre
Paaren 14	n_post - n_pre

Effektg

Paaren 1	a_post - a_pre
Paaren 2	b_post - b_pre
Paaren 3	c_post - c_pre
Paaren 4	d_post - d_pre
Paaren 5	e_post - e_pre
Paaren 6	f_post - f_pre
Paaren 7	g_post - g_pre

Paaren 8	h_post - h_pre
Paaren 9	i_post - i_pre
Paaren 10	j_post - j_pre
Paaren 11	k_post - k_pre
Paaren 12	l_post - l_pre
Paaren 13	m_post - m_pre
Paaren 14	n_post - n_pre

a. Der bei der Schätzung der Effektgrößen verwendete Nenner.
Cohen's d verwendet die Standardabweichung einer Stichprobe d
Hedges' Korrektur verwendet die Standardabweichung einer Stich

t-Test

Hinweise

Ausgabe erstellt		
Kommentare		
Eingabe	Daten	
	Aktiver Datensatz	
	Filter	

	Gewichtung
	Aufgeteilte Datei
	Anzahl der Zeilen in der Arbeitsdatei
Behandlung fehlender Werte	Definition für "fehlend"
	Verwendete Fälle
Syntax	
Ressourcen	Prozessorzeit
	Verstrichene Zeit

Statistil

Paaren 1	a_post	
	a_pre	
Paaren 2	b_post	
	b_pre	
Paaren 3	c_post	
	c_pre	
Paaren 4	d_post	
	d_pre	
Paaren 5	e_post	
	e_pre	
Paaren 6	f_post	
	f_pre	
Paaren 7	g_post	
	g_pre	
Paaren 8	h_post	
	h_pre	
Paaren 9	i_post	
	i_pre	
Paaren 10	j_post	
	j_pre	
Paaren 11	k_post	
	k_pre	
Paaren 12	l_post	
	l_pre	
Paaren 13	m_post	
	m_pre	
Paaren 14	n_post	
	n_pre	

Korrelatio

Paaren 1	a_post & a_pre
Paaren 2	b_post & b_pre
Paaren 3	c_post & c_pre

Paaren 4	d_post & d_pre
Paaren 5	e_post & e_pre
Paaren 6	f_post & f_pre
Paaren 7	g_post & g_pre
Paaren 8	h_post & h_pre
Paaren 9	i_post & i_pre
Paaren 10	j_post & j_pre
Paaren 11	k_post & k_pre
Paaren 12	l_post & l_pre
Paaren 13	m_post & m_pre
Paaren 14	n_post & n_pre

Paaren 1	a_post - a_pre
Paaren 2	b_post - b_pre
Paaren 3	c_post - c_pre
Paaren 4	d_post - d_pre
Paaren 5	e_post - e_pre
Paaren 6	f_post - f_pre
Paaren 7	g_post - g_pre
Paaren 8	h_post - h_pre
Paaren 9	i_post - i_pre
Paaren 10	j_post - j_pre
Paaren 11	k_post - k_pre
Paaren 12	l_post - l_pre
Paaren 13	m_post - m_pre
Paaren 14	n_post - n_pre

Effektg

Paaren 1	a_post - a_pre
Paaren 2	b_post - b_pre
Paaren 3	c_post - c_pre
Paaren 4	d_post - d_pre
Paaren 5	e_post - e_pre
Paaren 6	f_post - f_pre
Paaren 7	g_post - g_pre
Paaren 8	h_post - h_pre
Paaren 9	i_post - i_pre
Paaren 10	j_post - j_pre
Paaren 11	k_post - k_pre
Paaren 12	l_post - l_pre
Paaren 13	m_post - m_pre
Paaren 14	n_post - n_pre

a. Der bei der Schätzung der Effektgrößen verwendete Nenner.
Cohen's d verwendet die Standardabweichung einer Stichprobe d
Hedges' Korrektur verwendet die Standardabweichung einer Stich

t-Test

Hinweise

Ausgabe erstellt	
Kommentare	
Eingabe	Daten
	Aktiver Datensatz
	Filter

	Gewichtung
	Aufgeteilte Datei
	Anzahl der Zeilen in der Arbeitsdatei
Behandlung fehlender Werte	Definition für "fehlend"
	Verwendete Fälle
Syntax	
Ressourcen	Prozessorzeit
	Verstrichene Zeit

Statistil

Paaren 1	a_post
	a_pre
Paaren 2	b_post
	b_pre
Paaren 3	c_post
	c_pre
Paaren 4	d_post
	d_pre
Paaren 5	e_post
	e_pre
Paaren 6	f_post
	f_pre
Paaren 7	g_post
	g_pre
Paaren 8	h_post
	h_pre
Paaren 9	i_post
	i_pre
Paaren 10	j_post
	j_pre
Paaren 11	k_post
	k_pre
Paaren 12	l_post
	l_pre
Paaren 13	m_post
	m_pre
Paaren 14	n_post
	n_pre

Korrelatio

Paaren 1	a_post & a_pre
Paaren 2	b_post & b_pre
Paaren 3	c_post & c_pre

Paaren 4	d_post & d_pre
Paaren 5	e_post & e_pre
Paaren 6	f_post & f_pre
Paaren 7	g_post & g_pre
Paaren 8	h_post & h_pre
Paaren 9	i_post & i_pre
Paaren 10	j_post & j_pre
Paaren 11	k_post & k_pre
Paaren 12	l_post & l_pre
Paaren 13	m_post & m_pre
Paaren 14	n_post & n_pre

Paaren 1	a_post - a_pre
Paaren 2	b_post - b_pre
Paaren 3	c_post - c_pre
Paaren 4	d_post - d_pre
Paaren 5	e_post - e_pre
Paaren 6	f_post - f_pre
Paaren 7	g_post - g_pre
Paaren 8	h_post - h_pre
Paaren 9	i_post - i_pre
Paaren 10	j_post - j_pre
Paaren 11	k_post - k_pre
Paaren 12	l_post - l_pre
Paaren 13	m_post - m_pre
Paaren 14	n_post - n_pre

Effektg

Paaren 1	a_post - a_pre
Paaren 2	b_post - b_pre
Paaren 3	c_post - c_pre
Paaren 4	d_post - d_pre
Paaren 5	e_post - e_pre
Paaren 6	f_post - f_pre
Paaren 7	g_post - g_pre
Paaren 8	h_post - h_pre
Paaren 9	i_post - i_pre
Paaren 10	j_post - j_pre
Paaren 11	k_post - k_pre
Paaren 12	l_post - l_pre
Paaren 13	m_post - m_pre
Paaren 14	n_post - n_pre

a. Der bei der Schätzung der Effektgrößen verwendete Nenner.
Cohen's d verwendet die Standardabweichung einer Stichprobe d
Hedges' Korrektur verwendet die Standardabweichung einer Stich

t-Test

Hinweise

Ausgabe erstellt		
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Eingabe	Daten	
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	Filter	

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Syntax	
Ressourcen	Prozessorzeit
	Verstrichene Zeit

Statistil

Paaren 1	a_post
	a_pre
Paaren 2	b_post
	b_pre
Paaren 3	c_post
	c_pre
Paaren 4	d_post
	d_pre
Paaren 5	e_post
	e_pre
Paaren 6	f_post
	f_pre
Paaren 7	g_post
	g_pre
Paaren 8	h_post
	h_pre
Paaren 9	i_post
	i_pre
Paaren 10	j_post
	j_pre
Paaren 11	k_post
	k_pre
Paaren 12	l_post
	l_pre
Paaren 13	m_post
	m_pre
Paaren 14	n_post
	n_pre

Korrelatio

Paaren 1	a_post & a_pre
Paaren 2	b_post & b_pre
Paaren 3	c_post & c_pre

Paaren 4	d_post & d_pre
Paaren 5	e_post & e_pre
Paaren 6	f_post & f_pre
Paaren 7	g_post & g_pre
Paaren 8	h_post & h_pre
Paaren 9	i_post & i_pre
Paaren 10	j_post & j_pre
Paaren 11	k_post & k_pre
Paaren 12	l_post & l_pre
Paaren 13	m_post & m_pre
Paaren 14	n_post & n_pre

Paaren 1	a_post - a_pre
Paaren 2	b_post - b_pre
Paaren 3	c_post - c_pre
Paaren 4	d_post - d_pre
Paaren 5	e_post - e_pre
Paaren 6	f_post - f_pre
Paaren 7	g_post - g_pre
Paaren 8	h_post - h_pre
Paaren 9	i_post - i_pre
Paaren 10	j_post - j_pre
Paaren 11	k_post - k_pre
Paaren 12	l_post - l_pre
Paaren 13	m_post - m_pre
Paaren 14	n_post - n_pre

Effektg

Paaren 1	a_post - a_pre
Paaren 2	b_post - b_pre
Paaren 3	c_post - c_pre
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Paaren 7	g_post - g_pre
Paaren 8	h_post - h_pre
Paaren 9	i_post - i_pre
Paaren 10	j_post - j_pre
Paaren 11	k_post - k_pre
Paaren 12	l_post - l_pre
Paaren 13	m_post - m_pre
Paaren 14	n_post - n_pre

a. Der bei der Schätzung der Effektgrößen verwendete Nenner.
Cohen's d verwendet die Standardabweichung einer Stichprobe d
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t-Test

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Statistil

Paaren 1	a_post
	a_pre
Paaren 2	b_post
	b_pre
Paaren 3	c_post
	c_pre
Paaren 4	d_post
	d_pre
Paaren 5	e_post
	e_pre
Paaren 6	f_post
	f_pre
Paaren 7	g_post
	g_pre
Paaren 8	h_post
	h_pre
Paaren 9	i_post
	i_pre
Paaren 10	j_post
	j_pre
Paaren 11	k_post
	k_pre
Paaren 12	l_post
	l_pre
Paaren 13	m_post
	m_pre
Paaren 14	n_post
	n_pre

Korrelatio

Paaren 1	a_post & a_pre
Paaren 2	b_post & b_pre
Paaren 3	c_post & c_pre

Paaren 4	d_post & d_pre
Paaren 5	e_post & e_pre
Paaren 6	f_post & f_pre
Paaren 7	g_post & g_pre
Paaren 8	h_post & h_pre
Paaren 9	i_post & i_pre
Paaren 10	j_post & j_pre
Paaren 11	k_post & k_pre
Paaren 12	l_post & l_pre
Paaren 13	m_post & m_pre
Paaren 14	n_post & n_pre

Paaren 1	a_post - a_pre
Paaren 2	b_post - b_pre
Paaren 3	c_post - c_pre
Paaren 4	d_post - d_pre
Paaren 5	e_post - e_pre
Paaren 6	f_post - f_pre
Paaren 7	g_post - g_pre
Paaren 8	h_post - h_pre
Paaren 9	i_post - i_pre
Paaren 10	j_post - j_pre
Paaren 11	k_post - k_pre
Paaren 12	l_post - l_pre
Paaren 13	m_post - m_pre
Paaren 14	n_post - n_pre

Effektg

Paaren 1	a_post - a_pre
Paaren 2	b_post - b_pre
Paaren 3	c_post - c_pre
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Paaren 6	f_post - f_pre
Paaren 7	g_post - g_pre
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Paaren 9	i_post - i_pre
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Paaren 12	l_post - l_pre
Paaren 13	m_post - m_pre
Paaren 14	n_post - n_pre

a. Der bei der Schätzung der Effektgrößen verwendete Nenner.
Cohen's d verwendet die Standardabweichung einer Stichprobe d
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t-Test

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	Verstrichene Zeit

Statistil

Paaren 1	a_post	
	a_pre	
Paaren 2	b_post	
	b_pre	
Paaren 3	c_post	
	c_pre	
Paaren 4	d_post	
	d_pre	
Paaren 5	e_post	
	e_pre	
Paaren 6	f_post	
	f_pre	
Paaren 7	g_post	
	g_pre	
Paaren 8	h_post	
	h_pre	
Paaren 9	i_post	
	i_pre	
Paaren 10	j_post	
	j_pre	
Paaren 11	k_post	
	k_pre	
Paaren 12	l_post	
	l_pre	
Paaren 13	m_post	
	m_pre	
Paaren 14	n_post	
	n_pre	

Korrelatio

Paaren 1	a_post & a_pre
Paaren 2	b_post & b_pre
Paaren 3	c_post & c_pre

Paaren 4	d_post & d_pre
Paaren 5	e_post & e_pre
Paaren 6	f_post & f_pre
Paaren 7	g_post & g_pre
Paaren 8	h_post & h_pre
Paaren 9	i_post & i_pre
Paaren 10	j_post & j_pre
Paaren 11	k_post & k_pre
Paaren 12	l_post & l_pre
Paaren 13	m_post & m_pre
Paaren 14	n_post & n_pre

Paaren 1	a_post - a_pre
Paaren 2	b_post - b_pre
Paaren 3	c_post - c_pre
Paaren 4	d_post - d_pre
Paaren 5	e_post - e_pre
Paaren 6	f_post - f_pre
Paaren 7	g_post - g_pre
Paaren 8	h_post - h_pre
Paaren 9	i_post - i_pre
Paaren 10	j_post - j_pre
Paaren 11	k_post - k_pre
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Effektg

Paaren 1	a_post - a_pre
Paaren 2	b_post - b_pre
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Paaren 8	h_post - h_pre
Paaren 9	i_post - i_pre
Paaren 10	j_post - j_pre
Paaren 11	k_post - k_pre
Paaren 12	l_post - l_pre
Paaren 13	m_post - m_pre
Paaren 14	n_post - n_pre

a. Der bei der Schätzung der Effektgrößen verwendete Nenner.
Cohen's d verwendet die Standardabweichung einer Stichprobe d
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Statistil

Paaren 1	a_post
	a_pre
Paaren 2	b_post
	b_pre
Paaren 3	c_post
	c_pre
Paaren 4	d_post
	d_pre
Paaren 5	e_post
	e_pre
Paaren 6	f_post
	f_pre
Paaren 7	g_post
	g_pre
Paaren 8	h_post
	h_pre
Paaren 9	i_post
	i_pre
Paaren 10	j_post
	j_pre
Paaren 11	k_post
	k_pre
Paaren 12	l_post
	l_pre
Paaren 13	m_post
	m_pre
Paaren 14	n_post
	n_pre

Korrelatio

Paaren 1	a_post & a_pre
Paaren 2	b_post & b_pre
Paaren 3	c_post & c_pre

Paaren 4	d_post & d_pre
Paaren 5	e_post & e_pre
Paaren 6	f_post & f_pre
Paaren 7	g_post & g_pre
Paaren 8	h_post & h_pre
Paaren 9	i_post & i_pre
Paaren 10	j_post & j_pre
Paaren 11	k_post & k_pre
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Paaren 13	m_post & m_pre
Paaren 14	n_post & n_pre

Paaren 1	a_post - a_pre
Paaren 2	b_post - b_pre
Paaren 3	c_post - c_pre
Paaren 4	d_post - d_pre
Paaren 5	e_post - e_pre
Paaren 6	f_post - f_pre
Paaren 7	g_post - g_pre
Paaren 8	h_post - h_pre
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Paaren 10	j_post - j_pre
Paaren 11	k_post - k_pre
Paaren 12	l_post - l_pre
Paaren 13	m_post - m_pre
Paaren 14	n_post - n_pre

Effektg

Paaren 1	a_post - a_pre
Paaren 2	b_post - b_pre
Paaren 3	c_post - c_pre
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Paaren 11	k_post - k_pre
Paaren 12	l_post - l_pre
Paaren 13	m_post - m_pre
Paaren 14	n_post - n_pre

a. Der bei der Schätzung der Effektgrößen verwendete Nenner.
Cohen's d verwendet die Standardabweichung einer Stichprobe d
Hedges' Korrektur verwendet die Standardabweichung einer Stich

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Hinweise

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Statistil

Paaren 1	a_post
	a_pre
Paaren 2	b_post
	b_pre
Paaren 3	c_post
	c_pre
Paaren 4	d_post
	d_pre
Paaren 5	e_post
	e_pre
Paaren 6	f_post
	f_pre
Paaren 7	g_post
	g_pre
Paaren 8	h_post
	h_pre
Paaren 9	i_post
	i_pre
Paaren 10	j_post
	j_pre
Paaren 11	k_post
	k_pre
Paaren 12	l_post
	l_pre
Paaren 13	m_post
	m_pre
Paaren 14	n_post
	n_pre

Korrelatio

Paaren 1	a_post & a_pre
Paaren 2	b_post & b_pre
Paaren 3	c_post & c_pre

Paaren 4	d_post & d_pre
Paaren 5	e_post & e_pre
Paaren 6	f_post & f_pre
Paaren 7	g_post & g_pre
Paaren 8	h_post & h_pre
Paaren 9	i_post & i_pre
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Paaren 6	f_post - f_pre
Paaren 7	g_post - g_pre
Paaren 8	h_post - h_pre
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Paaren 12	l_post - l_pre
Paaren 13	m_post - m_pre
Paaren 14	n_post - n_pre

Effektg

Paaren 1	a_post - a_pre
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Paaren 11	k_post - k_pre
Paaren 12	l_post - l_pre
Paaren 13	m_post - m_pre
Paaren 14	n_post - n_pre

a. Der bei der Schätzung der Effektgrößen verwendete Nenner.
Cohen's d verwendet die Standardabweichung einer Stichprobe d
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	c_pre
Paaren 4	d_post
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	e_pre
Paaren 6	f_post
	f_pre
Paaren 7	g_post
	g_pre
Paaren 8	h_post
	h_pre
Paaren 9	i_post
	i_pre
Paaren 10	j_post
	j_pre
Paaren 11	k_post
	k_pre
Paaren 12	l_post
	l_pre
Paaren 13	m_post
	m_pre
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Korrelatio

Paaren 1	a_post & a_pre
Paaren 2	b_post & b_pre
Paaren 3	c_post & c_pre

Paaren 4	d_post & d_pre
Paaren 5	e_post & e_pre
Paaren 6	f_post & f_pre
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Paaren 8	h_post & h_pre
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Effektg

Paaren 1	a_post - a_pre
Paaren 2	b_post - b_pre
Paaren 3	c_post - c_pre
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Paaren 11	k_post - k_pre
Paaren 12	l_post - l_pre
Paaren 13	m_post - m_pre
Paaren 14	n_post - n_pre

a. Der bei der Schätzung der Effektgrößen verwendete Nenner.
Cohen's d verwendet die Standardabweichung einer Stichprobe d
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05-MAR-2024 00:27:40
C:\Users\lukas\OneDrive - Hochschule Ruhr West\Dokumente\HRW-WMA\Promotion\Publicationen\FabLab-Intervention Impact Paper\SPSS - Ausgaben\Fragebogenauswertung_DIE-Impact-bereinigt.sav
DataSet1
<keine>
<keine>
<keine>
242
Benutzerdefinierte fehlende Werte werden als fehlend behandelt.
Die Statistiken für jede Analyse basieren auf den Fällen, die für keine der Variablen fehlende Daten oder Daten außerhalb des Bereichs für die Gruppenvariable aufweisen.

```
T-TEST PAIRS=a_post b_post
c_post d_post e_post f_post
g_post h_post i_post j_post
k_post l_post
    m_post n_post WITH a_pre
b_pre c_pre d_pre e_pre f_pre
g_pre h_pre i_pre j_pre k_pre
l_pre m_pre
    n_pre (PAIRED)
  /ES DISPLAY(TRUE)
STANDARDIZER(SD)
  /CRITERIA=CI(.9500)
  /MISSING=ANALYSIS.
```

00:00:00,00
00:00:00,01

k bei gepaarten Stichproben

Mittelwert	N	Std.-Abweichung	Standardfehler des Mittelwertes
3.30	234	0.925	0.060
2.77	234	1.059	0.069
3.20	232	0.966	0.063
2.58	232	1.082	0.071
2.85	240	0.992	0.064
2.31	240	1.069	0.069
3.08	238	1.009	0.065
2.58	238	1.166	0.076
2.58	235	0.994	0.065
1.86	235	0.942	0.061
2.87	238	1.057	0.069
2.37	238	1.078	0.070
2.90	240	1.038	0.067
2.40	240	1.062	0.069

2.79	238	0.997	0.065
2.14	238	1.009	0.065
2.54	239	1.064	0.069
1.78	239	1.019	0.066
2.58	237	1.029	0.067
1.81	237	0.932	0.061
2.71	240	1.045	0.067
2.03	240	1.033	0.067
2.65	237	0.986	0.064
2.12	237	0.990	0.064
2.58	239	1.066	0.069
1.97	239	0.970	0.063
2.73	240	0.993	0.064
2.20	240	1.008	0.065

nen bei gepaarten Stichproben

		Signifikanz	
N	Korrelation	Einseitiges p	Zweiseitiges p
234	0.728	0.000	0.000
232	0.757	0.000	0.000
240	0.775	0.000	0.000
238	0.800	0.000	0.000
235	0.728	0.000	0.000
238	0.768	0.000	0.000
240	0.727	0.000	0.000
238	0.701	0.000	0.000
239	0.707	0.000	0.000
237	0.723	0.000	0.000
240	0.682	0.000	0.000
237	0.725	0.000	0.000
239	0.698	0.000	0.000
240	0.700	0.000	0.000

Test bei gepaarten Stichproben

Gepaarte Differenzen

Mittelwert	Std.-Abweichung	Standardfehler des Mittelwertes	95% Konfidenzinte
			Unterer Wert
0.534	0.742	0.048	0.439
0.625	0.722	0.047	0.532
0.538	0.696	0.045	0.449
0.500	0.704	0.046	0.410
0.715	0.716	0.047	0.623
0.504	0.728	0.047	0.411
0.500	0.776	0.050	0.401
0.647	0.775	0.050	0.548
0.757	0.799	0.052	0.656
0.772	0.736	0.048	0.678
0.683	0.828	0.053	0.578
0.532	0.734	0.048	0.438
0.611	0.796	0.051	0.509
0.521	0.776	0.050	0.422

rößen bei Stichproben mit paarigen Werten

	Standardisierer[a]	Punktschätzung	95% Konfid
			Unterer Wert
Cohen's d	0.742	0.720	0.576
Hedges' Korrektur	0.744	0.718	0.574
Cohen's d	0.722	0.866	0.714
Hedges' Korrektur	0.724	0.863	0.712
Cohen's d	0.696	0.773	0.628
Hedges' Korrektur	0.698	0.770	0.626
Cohen's d	0.704	0.710	0.567
Hedges' Korrektur	0.706	0.708	0.565
Cohen's d	0.716	0.999	0.841
Hedges' Korrektur	0.718	0.996	0.839
Cohen's d	0.728	0.693	0.551
Hedges' Korrektur	0.730	0.691	0.549
Cohen's d	0.776	0.644	0.505
Hedges' Korrektur	0.779	0.642	0.503

Cohen's d	0.775	0.835	0.687
Hedges' Korrektur	0.777	0.832	0.684
Cohen's d	0.799	0.948	0.794
Hedges' Korrektur	0.801	0.945	0.792
Cohen's d	0.736	1.050	0.890
Hedges' Korrektur	0.738	1.046	0.888
Cohen's d	0.828	0.825	0.678
Hedges' Korrektur	0.831	0.822	0.676
Cohen's d	0.734	0.725	0.581
Hedges' Korrektur	0.736	0.722	0.579
Cohen's d	0.796	0.767	0.622
Hedges' Korrektur	0.799	0.765	0.621
Cohen's d	0.776	0.671	0.531
Hedges' Korrektur	0.778	0.669	0.529

ler Mittelwertdifferenz.
ıprobe der Mittelwertdifferenz und einen Korrekturfaktor.

05-MAR-2024 01:00:27
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Benutzerdefinierte fehlende Werte werden als fehlend behandelt.
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T-TEST PAIRS=a_post b_post c_post d_post e_post f_post g_post h_post i_post j_post k_post l_post m_post n_post WITH a_pre b_pre c_pre d_pre e_pre f_pre g_pre h_pre i_pre j_pre k_pre l_pre m_pre n_pre (PAIRED) /ES DISPLAY(TRUE) STANDARDIZER(SD) /CRITERIA=CI(.9500) /MISSING=ANALYSIS.
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k bei gepaarten Stichproben

Mittelwert	N	Std.-Abweichung	Standardfehler des Mittelwertes

3.27	208	0.925	0.064
2.71	208	1.065	0.074
3.15	206	0.958	0.067
2.50	206	1.072	0.075
2.81	214	1.000	0.068
2.25	214	1.070	0.073
3.02	211	1.005	0.069
2.51	211	1.152	0.079
2.50	208	0.973	0.067
1.75	208	0.882	0.061
2.83	211	1.069	0.074
2.32	211	1.077	0.074
2.87	213	1.033	0.071
2.33	213	1.048	0.072
2.73	211	0.984	0.068
2.08	211	0.983	0.068
2.44	212	1.008	0.069
1.65	212	0.924	0.063
2.50	210	1.013	0.070
1.70	210	0.869	0.060
2.66	213	1.009	0.069
1.93	213	0.993	0.068
2.60	210	0.993	0.069
2.05	210	0.977	0.067
2.50	212	1.009	0.069
1.87	212	0.914	0.063
2.68	213	0.987	0.068
2.13	213	0.991	0.068

nen bei gepaarten Stichproben

		Signifikanz	
N	Korrelation	Einseitiges p	Zweiseitiges p
208	0.722	0.000	0.000
206	0.744	0.000	0.000
214	0.768	0.000	0.000

211	0.786	0.000	0.000
208	0.708	0.000	0.000
211	0.771	0.000	0.000
213	0.746	0.000	0.000
211	0.676	0.000	0.000
212	0.656	0.000	0.000
210	0.723	0.000	0.000
213	0.679	0.000	0.000
210	0.715	0.000	0.000
212	0.683	0.000	0.000
213	0.699	0.000	0.000

Test bei gepaarten Stichproben

Gepaarte Differenzen			
			95% Konfidenzinte
Mittelwert	Std.-Abweichung	Standardfehler des Mittelwertes	Unterer Wert
0.558	0.753	0.052	0.455
0.655	0.734	0.051	0.554
0.561	0.708	0.048	0.465
0.512	0.720	0.050	0.414
0.745	0.714	0.049	0.648
0.512	0.726	0.050	0.413
0.540	0.743	0.051	0.440
0.659	0.791	0.054	0.551
0.792	0.805	0.055	0.683
0.795	0.713	0.049	0.698
0.728	0.802	0.055	0.619
0.557	0.744	0.051	0.456
0.632	0.771	0.053	0.528
0.545	0.767	0.053	0.441

rößen bei Stichproben mit paarigen Werten

		95% Konfid
Standardisierer[a]	Punktschätzung	Unterer Wert

Cohen's d	0.753	0.741	0.587
Cohen's d	0.734	0.892	0.730
Cohen's d	0.708	0.792	0.638
Cohen's d	0.720	0.711	0.560
Cohen's d	0.714	1.044	0.874
Cohen's d	0.726	0.705	0.553
Cohen's d	0.743	0.727	0.575
Cohen's d	0.791	0.833	0.675
Cohen's d	0.805	0.984	0.819
Cohen's d	0.713	1.116	0.942
Cohen's d	0.802	0.908	0.747
Cohen's d	0.744	0.748	0.595
Cohen's d	0.771	0.820	0.664
Cohen's d	0.767	0.710	0.559

ler Mittelwertdifferenz.
ıprobe der Mittelwertdifferenz und einen Korrekturfaktor.

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k bei gepaarten Stichproben

Mittelwert	N	Std.-Abweichung	Standardfehler des Mittelwertes

3.67	24	0.868	0.177
3.29	24	0.908	0.185
3.71	24	0.908	0.185
3.29	24	0.955	0.195
3.16	25	0.898	0.180
2.84	25	0.943	0.189
3.64	25	0.907	0.181
3.24	25	1.091	0.218
3.32	25	0.852	0.170
2.76	25	0.970	0.194
3.24	25	0.926	0.185
2.84	25	0.987	0.197
3.28	25	0.980	0.196
2.96	25	1.060	0.212
3.28	25	1.021	0.204
2.72	25	1.100	0.220
3.40	25	1.155	0.231
2.88	25	1.166	0.233
3.24	25	0.970	0.194
2.60	25	1.080	0.216
3.28	25	1.137	0.227
2.76	25	1.091	0.218
3.12	25	0.833	0.167
2.76	25	0.926	0.185
3.36	25	1.186	0.237
2.76	25	1.091	0.218
3.20	25	0.957	0.191
2.80	25	1.000	0.200

nen bei gepaarten Stichproben

N	Korrelation	Signifikanz Einseitiges p	Signifikanz Zweiseitiges p
24	0.736	0.000	0.000
24	0.805	0.000	0.000
25	0.818	0.000	0.000

25	0.849	0.000	0.000
25	0.752	0.000	0.000
25	0.683	0.000	0.000
25	0.653	0.000	0.000
25	0.814	0.000	0.000
25	0.842	0.000	0.000
25	0.653	0.000	0.000
25	0.795	0.000	0.000
25	0.742	0.000	0.000
25	0.746	0.000	0.000
25	0.653	0.000	0.000

Test bei gepaarten Stichproben

Gepaarte Differenzen			
			95% Konfidenzinte
Mittelwert	Std.-Abweichung	Standardfehler des Mittelwertes	Unterer Wert
0.375	0.647	0.132	0.102
0.417	0.584	0.119	0.170
0.320	0.557	0.111	0.090
0.400	0.577	0.115	0.162
0.560	0.651	0.130	0.291
0.400	0.764	0.153	0.085
0.320	0.852	0.170	-0.032
0.560	0.651	0.130	0.291
0.520	0.653	0.131	0.250
0.640	0.860	0.172	0.285
0.520	0.714	0.143	0.225
0.360	0.638	0.128	0.097
0.600	0.816	0.163	0.263
0.400	0.816	0.163	0.063

rößen bei Stichproben mit paarigen Werten

		95% Konfid
Standardisierer[a]	Punktschätzung	Unterer Wert

Cohen's d	0.647	0.580	0.141
Cohen's d	0.584	0.714	0.258
Cohen's d	0.557	0.575	0.146
Cohen's d	0.577	0.693	0.249
Cohen's d	0.651	0.861	0.393
Cohen's d	0.764	0.524	0.100
Cohen's d	0.852	0.375	-0.034
Cohen's d	0.651	0.861	0.393
Cohen's d	0.653	0.796	0.338
Cohen's d	0.860	0.744	0.294
Cohen's d	0.714	0.728	0.280
Cohen's d	0.638	0.565	0.137
Cohen's d	0.816	0.735	0.286
Cohen's d	0.816	0.490	0.070

ler Mittelwertdifferenz.
nprobe der Mittelwertdifferenz und einen Korrekturfaktor.

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Benutzerdefinierte fehlende Werte werden als fehlend behandelt.
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k bei gepaarten Stichproben

Mittelwert	N	Std.-Abweichung	Standardfehler des Mittelwertes

3.21	189	0.920	0.067
2.62	189	1.027	0.075
3.13	186	0.963	0.071
2.46	186	1.056	0.077
2.79	194	0.992	0.071
2.20	194	1.041	0.075
2.98	193	0.971	0.070
2.42	193	1.106	0.080
2.55	191	0.982	0.071
1.81	191	0.906	0.066
2.79	193	1.047	0.075
2.24	193	1.040	0.075
2.86	194	1.013	0.073
2.31	194	1.023	0.073
2.73	192	0.991	0.071
2.04	192	0.962	0.069
2.48	193	1.061	0.076
1.72	193	0.972	0.070
2.54	193	1.030	0.074
1.76	193	0.888	0.064
2.68	194	1.049	0.075
1.93	194	0.979	0.070
2.59	191	0.995	0.072
2.03	191	0.965	0.070
2.51	193	1.066	0.077
1.88	193	0.914	0.066
2.68	194	1.009	0.072
2.09	194	0.986	0.071

nen bei gepaarten Stichproben

		Signifikanz	
N	Korrelation	Einseitiges p	Zweiseitiges p
189	0.685	0.000	0.000
186	0.721	0.000	0.000
194	0.743	0.000	0.000

193	0.753	0.000	0.000
191	0.700	0.000	0.000
193	0.732	0.000	0.000
194	0.689	0.000	0.000
192	0.653	0.000	0.000
193	0.684	0.000	0.000
193	0.703	0.000	0.000
194	0.638	0.000	0.000
191	0.702	0.000	0.000
193	0.667	0.000	0.000
194	0.664	0.000	0.000

Test bei gepaarten Stichproben

Gepaarte Differenzen			
			95% Konfidenzinte
Mittelwert	Std.-Abweichung	Standardfehler des Mittelwertes	Unterer Wert
0.582	0.779	0.057	0.470
0.677	0.759	0.056	0.568
0.593	0.730	0.052	0.489
0.565	0.741	0.053	0.460
0.743	0.734	0.053	0.639
0.544	0.763	0.055	0.436
0.541	0.802	0.058	0.428
0.698	0.814	0.059	0.582
0.767	0.812	0.058	0.652
0.788	0.751	0.054	0.681
0.747	0.866	0.062	0.625
0.565	0.757	0.055	0.457
0.632	0.819	0.059	0.516
0.588	0.818	0.059	0.472

rößen bei Stichproben mit paarigen Werten

		95% Konfid
Standardisierer[a]	Punktschätzung	Unterer Wert

Cohen's d	0.779	0.747	0.585
Cohen's d	0.759	0.892	0.721
Cohen's d	0.730	0.812	0.649
Cohen's d	0.741	0.762	0.601
Cohen's d	0.734	1.013	0.837
Cohen's d	0.763	0.713	0.554
Cohen's d	0.802	0.675	0.518
Cohen's d	0.814	0.858	0.691
Cohen's d	0.812	0.945	0.774
Cohen's d	0.751	1.049	0.872
Cohen's d	0.866	0.863	0.698
Cohen's d	0.757	0.747	0.586
Cohen's d	0.819	0.772	0.610
Cohen's d	0.818	0.719	0.560

ler Mittelwertdifferenz.
ıprobe der Mittelwertdifferenz und einen Korrekturfaktor.

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k bei gepaarten Stichproben

Mittelwert	N	Std.-Abweichung	Standardfehler des Mittelwertes

3.71	45	0.843	0.126
3.38	45	0.984	0.147
3.48	46	0.937	0.138
3.07	46	1.063	0.157
3.07	46	0.975	0.144
2.76	46	1.079	0.159
3.49	45	1.079	0.161
3.27	45	1.176	0.175
2.70	44	1.047	0.158
2.11	44	1.061	0.160
3.22	45	1.042	0.155
2.89	45	1.092	0.163
3.09	46	1.132	0.167
2.76	46	1.158	0.171
3.02	46	1.000	0.147
2.59	46	1.087	0.160
2.76	46	1.058	0.156
2.04	46	1.173	0.173
2.73	44	1.020	0.154
2.02	44	1.089	0.164
2.87	46	1.024	0.151
2.46	46	1.149	0.169
2.91	46	0.915	0.135
2.52	46	1.005	0.148
2.85	46	1.032	0.152
2.33	46	1.117	0.165
2.93	46	0.904	0.133
2.70	46	0.963	0.142

nen bei gepaarten Stichproben

		Signifikanz	
N	Korrelation	Einseitiges p	Zweiseitiges p
45	0.847	0.000	0.000
46	0.883	0.000	0.000
46	0.902	0.000	0.000

45	0.934	0.000	0.000
44	0.826	0.000	0.000
45	0.881	0.000	0.000
46	0.847	0.000	0.000
46	0.867	0.000	0.000
46	0.779	0.000	0.000
44	0.802	0.000	0.000
46	0.864	0.000	0.000
46	0.800	0.000	0.000
46	0.796	0.000	0.000
46	0.870	0.000	0.000

Test bei gepaarten Stichproben

Gepaarte Differenzen			
			95% Konfidenzinte
Mittelwert	Std.-Abweichung	Standardfehler des Mittelwertes	Unterer Wert
0.333	0.522	0.078	0.176
0.413	0.498	0.073	0.265
0.304	0.465	0.069	0.166
0.222	0.420	0.063	0.096
0.591	0.622	0.094	0.402
0.333	0.522	0.078	0.176
0.326	0.634	0.094	0.138
0.435	0.544	0.080	0.273
0.717	0.750	0.111	0.495
0.705	0.668	0.101	0.502
0.413	0.580	0.086	0.241
0.391	0.614	0.091	0.209
0.522	0.691	0.102	0.317
0.239	0.480	0.071	0.097

rößen bei Stichproben mit paarigen Werten

		95% Konfid
Standardisierer[a]	Punktschätzung	Unterer Wert

Cohen's d	0.522	0.638	0.314
Cohen's d	0.498	0.830	0.491
Cohen's d	0.465	0.654	0.332
Cohen's d	0.420	0.529	0.214
Cohen's d	0.622	0.950	0.589
Cohen's d	0.522	0.638	0.314
Cohen's d	0.634	0.514	0.204
Cohen's d	0.544	0.800	0.464
Cohen's d	0.750	0.956	0.603
Cohen's d	0.668	1.055	0.682
Cohen's d	0.580	0.712	0.385
Cohen's d	0.614	0.637	0.317
Cohen's d	0.691	0.755	0.424
Cohen's d	0.480	0.498	0.189

ler Mittelwertdifferenz.
ıprobe der Mittelwertdifferenz und einen Korrekturfaktor.

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Benutzerdefinierte fehlende Werte werden als fehlend behandelt.
Die Statistiken für jede Analyse basieren auf den Fällen, die für keine der Variablen fehlende Daten oder Daten außerhalb des Bereichs für die Gruppenvariable aufweisen.
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k bei gepaarten Stichproben

Mittelwert	N	Std.-Abweichung	Standardfehler des Mittelwertes

2.96	48	0.898	0.130
2.33	48	1.059	0.153
2.91	44	0.936	0.141
2.05	44	0.939	0.142
2.62	52	1.087	0.151
2.04	52	1.204	0.167
2.80	51	1.020	0.143
2.24	51	1.176	0.165
2.47	53	1.012	0.139
1.70	53	0.932	0.128
2.65	51	1.036	0.145
2.06	51	1.066	0.149
2.74	53	1.095	0.150
2.23	53	1.103	0.152
2.71	51	0.965	0.135
1.98	51	1.104	0.155
2.25	53	0.998	0.137
1.58	53	0.929	0.128
2.49	51	0.903	0.126
1.71	51	0.901	0.126
2.62	53	1.023	0.141
1.91	53	1.114	0.153
2.47	51	1.007	0.141
1.78	51	0.923	0.129
2.24	50	0.938	0.133
1.66	50	0.745	0.105
2.47	51	0.946	0.132
1.88	51	0.909	0.127

nen bei gepaarten Stichproben

		Signifikanz	
N	Korrelation	Einseitiges p	Zweiseitiges p
48	0.641	0.000	0.000
44	0.561	0.000	0.000
52	0.715	0.000	0.000

51	0.723	0.000	0.000
53	0.725	0.000	0.000
51	0.707	0.000	0.000
53	0.751	0.000	0.000
51	0.689	0.000	0.000
53	0.610	0.000	0.000
51	0.722	0.000	0.000
53	0.508	0.000	0.000
51	0.692	0.000	0.000
50	0.382	0.003	0.006
51	0.648	0.000	0.000

Test bei gepaarten Stichproben

Gepaarte Differenzen			
			95% Konfidenzinte
Mittelwert	Std.-Abweichung	Standardfehler des Mittelwertes	Unterer Wert
0.625	0.841	0.121	0.381
0.864	0.878	0.132	0.597
0.577	0.871	0.121	0.334
0.569	0.831	0.116	0.335
0.774	0.724	0.099	0.574
0.588	0.804	0.113	0.362
0.509	0.775	0.106	0.296
0.725	0.827	0.116	0.493
0.660	0.854	0.117	0.425
0.784	0.673	0.094	0.595
0.717	1.063	0.146	0.424
0.686	0.761	0.107	0.472
0.580	0.950	0.134	0.310
0.588	0.779	0.109	0.369

rößen bei Stichproben mit paarigen Werten

			95% Konfid
	Standardisierer[a]	Punktschätzung	Unterer Wert

Cohen's d	0.841	0.743	0.420
Cohen's d	0.878	0.983	0.618
Cohen's d	0.871	0.662	0.359
Cohen's d	0.831	0.684	0.376
Cohen's d	0.724	1.068	0.726
Cohen's d	0.804	0.731	0.419
Cohen's d	0.775	0.657	0.357
Cohen's d	0.827	0.878	0.551
Cohen's d	0.854	0.774	0.463
Cohen's d	0.673	1.166	0.806
Cohen's d	1.063	0.675	0.373
Cohen's d	0.761	0.901	0.572
Cohen's d	0.950	0.611	0.306
Cohen's d	0.779	0.755	0.440

ler Mittelwertdifferenz.
ıprobe der Mittelwertdifferenz und einen Korrekturfaktor.

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Benutzerdefinierte fehlende Werte werden als fehlend behandelt.
Die Statistiken für jede Analyse basieren auf den Fällen, die für keine der Variablen fehlende Daten oder Daten außerhalb des Bereichs für die Gruppenvariable aufweisen.
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k bei gepaarten Stichproben

Mittelwert	N	Std.-Abweichung	Standardfehler des Mittelwertes

3.02	66	0.850	0.105
2.29	66	0.837	0.103
2.93	67	0.926	0.113
2.15	67	0.942	0.115
2.70	67	1.000	0.122
2.00	67	0.905	0.111
2.76	66	0.978	0.120
2.11	66	1.083	0.133
2.34	65	0.989	0.123
1.55	65	0.685	0.085
2.70	67	1.155	0.141
2.09	67	1.125	0.137
2.82	66	0.991	0.122
2.11	66	0.963	0.119
2.62	65	0.979	0.121
1.86	65	0.827	0.103
2.42	66	1.053	0.130
1.56	66	0.914	0.112
2.34	67	1.038	0.127
1.57	67	0.763	0.093
2.45	66	0.931	0.115
1.67	66	0.730	0.090
2.41	66	0.960	0.118
1.73	66	0.775	0.095
2.45	67	1.034	0.126
1.79	67	0.845	0.103
2.55	67	0.974	0.119
1.87	67	0.869	0.106

nen bei gepaarten Stichproben

		Signifikanz	
N	Korrelation	Einseitiges p	Zweiseitiges p
66	0.578	0.000	0.000
67	0.743	0.000	0.000
67	0.737	0.000	0.000

66	0.708	0.000	0.000
65	0.572	0.000	0.000
67	0.803	0.000	0.000
66	0.617	0.000	0.000
65	0.609	0.000	0.000
66	0.628	0.000	0.000
67	0.707	0.000	0.000
66	0.475	0.000	0.000
66	0.586	0.000	0.000
67	0.647	0.000	0.000
67	0.519	0.000	0.000

Test bei gepaarten Stichproben

Gepaarte Differenzen			
			95% Konfidenzinte
Mittelwert	Std.-Abweichung	Standardfehler des Mittelwertes	Unterer Wert
0.727	0.775	0.095	0.537
0.776	0.670	0.082	0.613
0.701	0.697	0.085	0.532
0.652	0.794	0.098	0.456
0.785	0.820	0.102	0.582
0.612	0.717	0.088	0.437
0.712	0.855	0.105	0.502
0.754	0.811	0.101	0.553
0.864	0.857	0.106	0.653
0.776	0.735	0.090	0.597
0.788	0.869	0.107	0.574
0.682	0.807	0.099	0.483
0.657	0.808	0.099	0.460
0.687	0.908	0.111	0.465

rößen bei Stichproben mit paarigen Werten

			95% Konfid
	Standardisierer[a]	Punktschätzung	Unterer Wert

Cohen's d	0.775	0.938	0.645
Cohen's d	0.670	1.158	0.845
Cohen's d	0.697	1.007	0.710
Cohen's d	0.794	0.820	0.539
Cohen's d	0.820	0.957	0.661
Cohen's d	0.717	0.854	0.571
Cohen's d	0.855	0.833	0.550
Cohen's d	0.811	0.930	0.636
Cohen's d	0.857	1.007	0.708
Cohen's d	0.735	1.056	0.754
Cohen's d	0.869	0.907	0.618
Cohen's d	0.807	0.845	0.561
Cohen's d	0.808	0.813	0.534
Cohen's d	0.908	0.756	0.482

ler Mittelwertdifferenz.
ıprobe der Mittelwertdifferenz und einen Korrekturfaktor.

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Die Statistiken für jede Analyse basieren auf den Fällen, die für keine der Variablen fehlende Daten oder Daten außerhalb des Bereichs für die Gruppenvariable aufweisen.
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00:00:00,01

k bei gepaarten Stichproben

Mittelwert	N	Std.-Abweichung	Standardfehler des Mittelwertes

3.51	84	0.898	0.098
3.07	84	0.991	0.108
3.32	84	0.920	0.100
2.86	84	0.959	0.105
2.99	84	0.857	0.094
2.55	84	0.962	0.105
3.23	83	0.888	0.097
2.82	83	0.977	0.107
2.74	82	0.940	0.104
2.07	82	0.953	0.105
2.89	82	0.943	0.104
2.46	82	0.905	0.100
2.89	83	1.059	0.116
2.49	83	1.017	0.112
2.86	84	1.008	0.110
2.25	84	0.980	0.107
2.63	83	1.067	0.117
1.88	83	0.968	0.106
2.65	83	1.005	0.110
1.93	83	0.947	0.104
2.86	83	1.117	0.123
2.16	83	1.018	0.112
2.80	83	1.009	0.111
2.37	83	0.996	0.109
2.67	84	1.123	0.123
2.02	84	0.981	0.107
2.89	84	1.030	0.112
2.43	84	0.997	0.109

nen bei gepaarten Stichproben

		Signifikanz	
N	Korrelation	Einseitiges p	Zweiseitiges p
84	0.730	0.000	0.000
84	0.763	0.000	0.000
84	0.797	0.000	0.000

83	0.821	0.000	0.000
82	0.751	0.000	0.000
82	0.682	0.000	0.000
83	0.741	0.000	0.000
84	0.683	0.000	0.000
83	0.735	0.000	0.000
83	0.690	0.000	0.000
83	0.771	0.000	0.000
83	0.768	0.000	0.000
84	0.772	0.000	0.000
84	0.726	0.000	0.000

Test bei gepaarten Stichproben

Gepaarte Differenzen			
			95% Konfidenzinte
Mittelwert	Std.-Abweichung	Standardfehler des Mittelwertes	Unterer Wert
0.440	0.700	0.076	0.289
0.464	0.648	0.071	0.324
0.440	0.588	0.064	0.313
0.410	0.564	0.062	0.287
0.671	0.668	0.074	0.524
0.427	0.738	0.081	0.265
0.398	0.748	0.082	0.234
0.607	0.792	0.086	0.435
0.747	0.746	0.082	0.584
0.723	0.770	0.085	0.555
0.699	0.728	0.080	0.540
0.422	0.683	0.075	0.273
0.643	0.722	0.079	0.486
0.464	0.752	0.082	0.301

rößen bei Stichproben mit paarigen Werten

		95% Konfid
Standardisierer[a]	Punktschätzung	Unterer Wert

Cohen's d	0.700	0.629	0.393
Cohen's d	0.648	0.716	0.474
Cohen's d	0.588	0.749	0.505
Cohen's d	0.564	0.726	0.483
Cohen's d	0.668	1.005	0.737
Cohen's d	0.738	0.579	0.343
Cohen's d	0.748	0.532	0.300
Cohen's d	0.792	0.767	0.521
Cohen's d	0.746	1.001	0.735
Cohen's d	0.770	0.939	0.678
Cohen's d	0.728	0.960	0.697
Cohen's d	0.683	0.617	0.381
Cohen's d	0.722	0.890	0.635
Cohen's d	0.752	0.618	0.383

ler Mittelwertdifferenz.
ıprobe der Mittelwertdifferenz und einen Korrekturfaktor.

05-MAR-2024 01:09:32
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Education > 3 (FILTER)

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Benutzerdefinierte fehlende Werte werden als fehlend behandelt.
Die Statistiken für jede Analyse basieren auf den Fällen, die für keine der Variablen fehlende Daten oder Daten außerhalb des Bereichs für die Gruppenvariable aufweisen.
T-TEST PAIRS=a_post b_post c_post d_post e_post f_post g_post h_post i_post j_post k_post l_post m_post n_post WITH a_pre b_pre c_pre d_pre e_pre f_pre g_pre h_pre i_pre j_pre k_pre l_pre m_pre n_pre (PAIRED) /ES DISPLAY(TRUE) STANDARDIZER(SD) /CRITERIA=CI(.9500) /MISSING=ANALYSIS.
00:00:00,02
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k bei gepaarten Stichproben

Mittelwert	N	Std.-Abweichung	Standardfehler des Mittelwertes

3.83	35	0.822	0.139
3.60	35	0.812	0.137
3.75	36	0.874	0.146
3.39	36	1.103	0.184
3.14	35	1.061	0.179
2.80	35	1.106	0.187
3.72	36	0.974	0.162
3.44	36	1.107	0.184
2.88	33	0.992	0.173
2.27	33	1.126	0.196
3.47	36	0.971	0.162
3.11	36	1.008	0.168
3.33	36	0.926	0.154
2.94	36	0.984	0.164
3.14	36	0.961	0.160
2.69	36	1.009	0.168
2.97	35	1.071	0.181
2.29	35	1.274	0.215
2.94	34	1.099	0.189
2.15	34	1.132	0.194
3.06	36	0.984	0.164
2.64	36	1.125	0.188
3.06	36	0.791	0.132
2.78	36	0.929	0.155
3.03	36	0.941	0.157
2.58	36	1.156	0.193
3.08	36	0.841	0.140
2.83	36	1.000	0.167

nen bei gepaarten Stichproben

		Signifikanz	
N	Korrelation	Einseitiges p	Zweiseitiges p
35	0.864	0.000	0.000
36	0.904	0.000	0.000
35	0.877	0.000	0.000

36	0.886	0.000	0.000
33	0.842	0.000	0.000
36	0.821	0.000	0.000
36	0.868	0.000	0.000
36	0.841	0.000	0.000
35	0.826	0.000	0.000
34	0.811	0.000	0.000
36	0.896	0.000	0.000
36	0.795	0.000	0.000
36	0.799	0.000	0.000
36	0.900	0.000	0.000

Test bei gepaarten Stichproben

Gepaarte Differenzen			
			95% Konfidenzinte
Mittelwert	Std.-Abweichung	Standardfehler des Mittelwertes	Unterer Wert
0.229	0.426	0.072	0.082
0.361	0.487	0.081	0.196
0.343	0.539	0.091	0.158
0.278	0.513	0.086	0.104
0.606	0.609	0.106	0.390
0.361	0.593	0.099	0.160
0.389	0.494	0.082	0.222
0.444	0.558	0.093	0.256
0.686	0.718	0.121	0.439
0.794	0.687	0.118	0.555
0.417	0.500	0.083	0.247
0.278	0.566	0.094	0.086
0.444	0.695	0.116	0.209
0.250	0.439	0.073	0.101

rößen bei Stichproben mit paarigen Werten

		95% Konfid
Standardisierer[a]	Punktschätzung	Unterer Wert

Cohen's d	0.426	0.536	0.178
Cohen's d	0.487	0.741	0.367
Cohen's d	0.539	0.636	0.268
Cohen's d	0.513	0.541	0.188
Cohen's d	0.609	0.995	0.571
Cohen's d	0.593	0.609	0.249
Cohen's d	0.494	0.787	0.408
Cohen's d	0.558	0.797	0.417
Cohen's d	0.718	0.955	0.549
Cohen's d	0.687	1.157	0.715
Cohen's d	0.500	0.833	0.449
Cohen's d	0.566	0.491	0.141
Cohen's d	0.695	0.640	0.277
Cohen's d	0.439	0.569	0.213

ler Mittelwertdifferenz.
ıprobe der Mittelwertdifferenz und einen Korrekturfaktor.

Signifikanz

ervall der Differenz				
Oberer Wert	T	df	Einseitiges p	Zweiseitiges p
0.630	11.015	233	0.000	0.000
0.718	13.187	231	0.000	0.000
0.626	11.970	239	0.000	0.000
0.590	10.955	237	0.000	0.000
0.807	15.310	234	0.000	0.000
0.597	10.689	237	0.000	0.000
0.599	9.979	239	0.000	0.000
0.746	12.880	237	0.000	0.000
0.859	14.654	238	0.000	0.000
0.866	16.160	236	0.000	0.000
0.789	12.782	239	0.000	0.000
0.626	11.157	236	0.000	0.000
0.712	11.864	238	0.000	0.000
0.620	10.399	239	0.000	0.000

0.603

enzintervall
Oberer Wert
0.863
0.861
1.016
1.013
0.916
0.913
0.852
0.849
1.155
1.151
0.834
0.831
0.783
0.780

0.982
0.979
1.100
1.096
1.208
1.204
0.971
0.968
0.867
0.864
0.911
0.908
0.811
0.808

ervall der Differenz			Signifikanz	
Oberer Wert	T	df	Einseitiges p	Zweiseitiges p
0.661	10.684	207	0.000	0.000
0.756	12.810	205	0.000	0.000
0.656	11.589	213	0.000	0.000
0.609	10.333	210	0.000	0.000
0.843	15.055	207	0.000	0.000
0.610	10.239	210	0.000	0.000
0.640	10.611	212	0.000	0.000
0.766	12.096	210	0.000	0.000
0.901	14.326	211	0.000	0.000
0.892	16.167	209	0.000	0.000
0.836	13.250	212	0.000	0.000
0.658	10.846	209	0.000	0.000
0.736	11.943	211	0.000	0.000
0.648	10.358	212	0.000	0.000

enzintervall
Oberer Wert

0.894
1.053
0.945
0.862
1.212
0.855
0.877
0.989
1.147
1.287
1.067
0.901
0.975
0.859

ervall der Differenz			Signifikanz	
Oberer Wert	T	df	Einseitiges p	Zweiseitiges p
0.648	2.840	23	0.005	0.009
0.663	3.498	23	0.001	0.002
0.550	2.874	24	0.004	0.008
0.638	3.464	24	0.001	0.002
0.829	4.303	24	0.000	0.000
0.715	2.619	24	0.008	0.015
0.672	1.877	24	0.036	0.073
0.829	4.303	24	0.000	0.000
0.790	3.980	24	0.000	0.001
0.995	3.720	24	0.001	0.001
0.815	3.641	24	0.001	0.001
0.623	2.823	24	0.005	0.009
0.937	3.674	24	0.001	0.001
0.737	2.449	24	0.011	0.022

enzintervall
Oberer Wert

1.008
1.157
0.994
1.125
1.315
0.938
0.778
1.315
1.241
1.182
1.164
0.982
1.172
0.901

...ervall der Differenz			Signifikanz	
Oberer Wert	T	df	Einseitiges p	Zweiseitiges p
0.694	10.276	188	0.000	0.000
0.787	12.168	185	0.000	0.000
0.696	11.311	193	0.000	0.000
0.670	10.588	192	0.000	0.000
0.848	13.994	190	0.000	0.000
0.652	9.901	192	0.000	0.000
0.655	9.399	193	0.000	0.000
0.814	11.884	191	0.000	0.000
0.882	13.124	192	0.000	0.000
0.894	14.569	192	0.000	0.000
0.870	12.026	193	0.000	0.000
0.674	10.321	190	0.000	0.000
0.748	10.719	192	0.000	0.000
0.703	10.011	193	0.000	0.000

enzintervall
Oberer Wert

0.908
1.061
0.974
0.922
1.186
0.870
0.830
1.022
1.114
1.224
1.028
0.906
0.932
0.876

ervall der Differenz			Signifikanz	
Oberer Wert	T	df	Einseitiges p	Zweiseitiges p
0.490	4.282	44	0.000	0.000
0.561	5.627	45	0.000	0.000
0.442	4.437	45	0.000	0.000
0.349	3.546	44	0.000	0.001
0.780	6.302	43	0.000	0.000
0.490	4.282	44	0.000	0.000
0.514	3.486	45	0.001	0.001
0.596	5.423	45	0.000	0.000
0.940	6.486	45	0.000	0.000
0.907	7.001	43	0.000	0.000
0.585	4.828	45	0.000	0.000
0.574	4.323	45	0.000	0.000
0.727	5.122	45	0.000	0.000
0.382	3.379	45	0.001	0.002

enzintervall
Oberer Wert

0.956
1.162
0.970
0.838
1.303
0.956
0.819
1.129
1.302
1.421
1.033
0.952
1.080
0.802

ervall der Differenz			Signifikanz	
Oberer Wert	T	df	Einseitiges p	Zweiseitiges p
0.869	5.148	47	0.000	0.000
1.131	6.521	43	0.000	0.000
0.819	4.776	51	0.000	0.000
0.802	4.888	50	0.000	0.000
0.973	7.775	52	0.000	0.000
0.814	5.222	50	0.000	0.000
0.723	4.784	52	0.000	0.000
0.958	6.268	50	0.000	0.000
0.896	5.632	52	0.000	0.000
0.974	8.326	50	0.000	0.000
1.010	4.911	52	0.000	0.000
0.900	6.437	50	0.000	0.000
0.850	4.319	49	0.000	0.000
0.807	5.392	50	0.000	0.000

enzintervall
Oberer Wert

1.060
1.340
0.960
0.987
1.403
1.038
0.952
1.198
1.078
1.519
0.971
1.224
0.910
1.064

ervall der Differenz			Signifikanz	
Oberer Wert	T	df	Einseitiges p	Zweiseitiges p
0.918	7.619	65	0.000	0.000
0.940	9.480	66	0.000	0.000
0.871	8.242	66	0.000	0.000
0.847	6.666	65	0.000	0.000
0.988	7.719	64	0.000	0.000
0.787	6.988	66	0.000	0.000
0.922	6.765	65	0.000	0.000
0.955	7.497	64	0.000	0.000
1.074	8.184	65	0.000	0.000
0.955	8.645	66	0.000	0.000
1.001	7.370	65	0.000	0.000
0.880	6.865	65	0.000	0.000
0.854	6.652	66	0.000	0.000
0.908	6.189	66	0.000	0.000

enzintervall
Oberer Wert

1.225
1.466
1.299
1.097
1.249
1.131
1.111
1.219
1.302
1.353
1.192
1.124
1.087
1.026

ervall der Differenz			Signifikanz	
Oberer Wert	T	df	Einseitiges p	Zweiseitiges p
0.592	5.765	83	0.000	0.000
0.605	6.563	83	0.000	0.000
0.568	6.865	83	0.000	0.000
0.533	6.618	82	0.000	0.000
0.817	9.097	81	0.000	0.000
0.589	5.241	81	0.000	0.000
0.561	4.843	82	0.000	0.000
0.779	7.028	83	0.000	0.000
0.910	9.117	82	0.000	0.000
0.891	8.552	82	0.000	0.000
0.858	8.744	82	0.000	0.000
0.571	5.626	82	0.000	0.000
0.800	8.159	83	0.000	0.000
0.627	5.661	83	0.000	0.000

enzintervall
Oberer Wert

0.862
0.954
0.989
0.967
1.268
0.811
0.760
1.009
1.263
1.195
1.218
0.851
1.141
0.850

ervall der Differenz			Signifikanz	
Oberer Wert	T	df	Einseitiges p	Zweiseitiges p
0.375	3.174	34	0.002	0.003
0.526	4.448	35	0.000	0.000
0.528	3.762	34	0.000	0.001
0.451	3.247	35	0.001	0.003
0.822	5.714	32	0.000	0.000
0.562	3.654	35	0.000	0.001
0.556	4.719	35	0.000	0.000
0.633	4.781	35	0.000	0.000
0.932	5.648	34	0.000	0.000
1.034	6.744	33	0.000	0.000
0.586	5.000	35	0.000	0.000
0.469	2.943	35	0.003	0.006
0.679	3.839	35	0.000	0.000
0.399	3.416	35	0.001	0.002

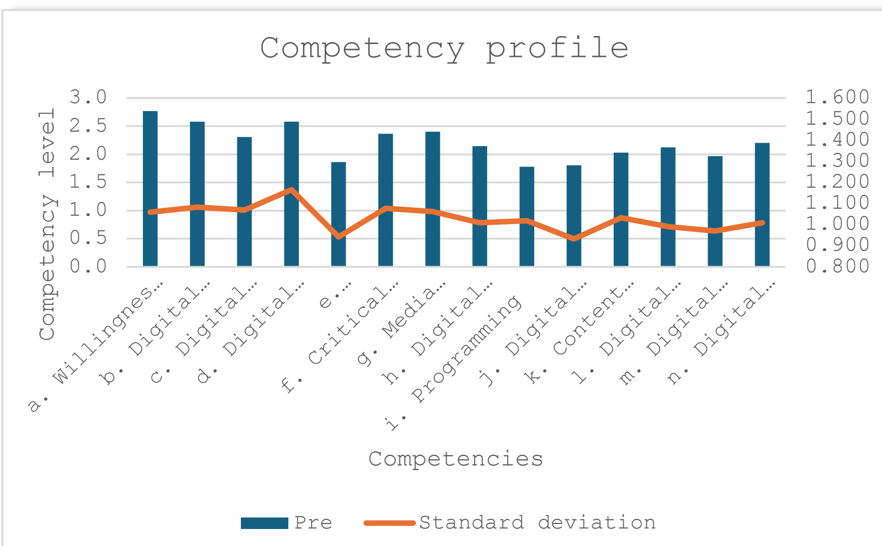
enzintervall
Oberer Wert

0.888
1.107
0.996
0.888
1.408
0.962
1.157
1.168
1.351
1.587
1.209
0.834
0.995
0.918

a. Willingnes to Learn
b. Digital Learning
c. Digital Coaching
d. Digital Information Seeking
e. Understanding Digital Transformation
f. Critical Thinking
g. Media Analysis
h. Digital Problem Solving
i. Programming
j. Digital Innovating
k. Content Creation
l. Digital Interaction
m. Digital Collaboration & Cooperation
n. Digital Presenting

All

Comp	Mittelwert	Standard deviation	T	df	Zweiseitiges p	Effektgröße zung / (cohens) d
a	0.534	0.742	11.015	233	0.000	0.720
b	0.625	0.722	13.187	231	0.000	0.866
c	0.538	0.696	11.970	239	0.000	0.773
d	0.500	0.704	10.955	237	0.000	0.710
e	0.715	0.716	15.310	234	0.000	0.999
f	0.504	0.728	10.689	237	0.000	0.693
g	0.500	0.776	9.979	239	0.000	0.644
h	0.647	0.775	12.880	237	0.000	0.835
i	0.757	0.799	14.654	238	0.000	0.948
j	0.772	0.736	16.160	236	0.000	1.050
k	0.683	0.828	12.782	239	0.000	0.825
l	0.532	0.734	11.157	236	0.000	0.725
m	0.611	0.796	11.864	238	0.000	0.767
n	0.521	0.776	10.399	239	0.000	0.671



without Experience

	Δ Pre & Post	Standard deviation	T	df	Zweiseitiges p
a	0.558	0.753	10.684	207	0.000
b	0.655	0.734	12.810	205	0.000
c	0.561	0.708	11.589	213	0.000
d	0.512	0.720	10.333	210	0.000
e	0.745	0.714	15.055	207	0.000
f	0.512	0.726	10.239	210	0.000
g	0.540	0.743	10.611	212	0.000
h	0.659	0.791	12.096	210	0.000
i	0.792	0.805	14.326	211	0.000
j	0.795	0.713	16.167	209	0.000
k	0.728	0.802	13.250	212	0.000
l	0.557	0.744	10.846	209	0.000
m	0.632	0.771	11.943	211	0.000
n	0.545	0.767	10.358	212	0.000

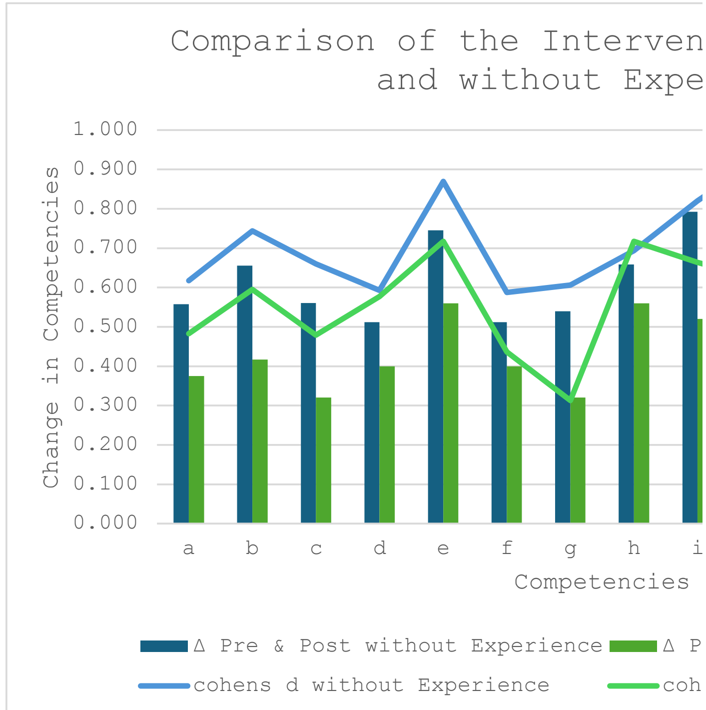
0.628

with experience

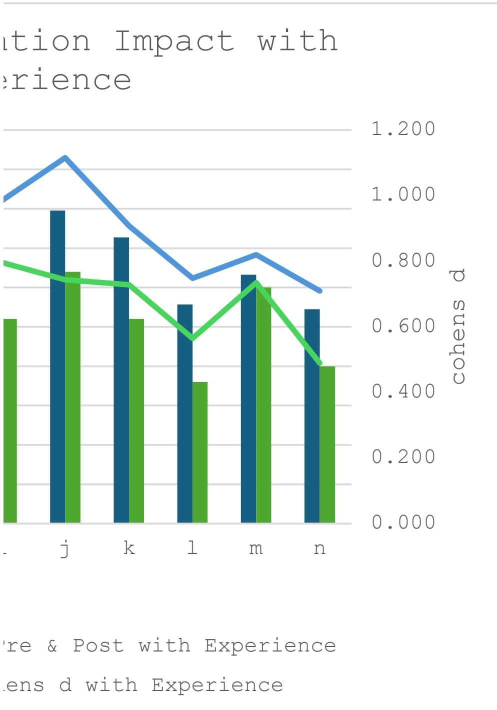
	Δ Pre & Post with	Standard deviation	T	df	Zweiseitiges p
a	0.375	0.647	2.840	23	0.009
b	0.417	0.584	3.498	23	0.002
c	0.320	0.557	2.874	24	0.008
d	0.400	0.577	3.464	24	0.002
e	0.560	0.651	4.303	24	0.000
f	0.400	0.764	2.619	24	0.015
g	0.320	0.852	1.877	24	0.073
h	0.560	0.651	4.303	24	0.000
i	0.520	0.653	3.980	24	0.001
j	0.640	0.860	3.720	24	0.001
k	0.520	0.714	3.641	24	0.001
l	0.360	0.638	2.823	24	0.009
m	0.600	0.816	3.674	24	0.001
n	0.400	0.816	2.449	24	0.022

0.457

cohens d without
0.741
0.892
0.792
0.711
1.044
0.705
0.727
0.833
0.984
1.116
0.908
0.748
0.820
0.710



cohens d with
0.580
0.714
0.575
0.693
0.861
0.524
0.375
0.861
0.796
0.744
0.728
0.565
0.735
0.490



under 20 Years

	Δ Pre & Post <20	Standard deviation	T
a	0.582	0.779	10.276
b	0.677	0.759	12.168
c	0.593	0.730	11.311
d	0.565	0.741	10.588
e	0.743	0.734	13.994
f	0.544	0.763	9.901
g	0.541	0.802	9.399
h	0.698	0.814	11.884
i	0.767	0.812	13.124
j	0.788	0.751	14.569
k	0.747	0.866	12.026
l	0.565	0.757	10.321
m	0.632	0.819	10.719
n	0.588	0.818	10.011

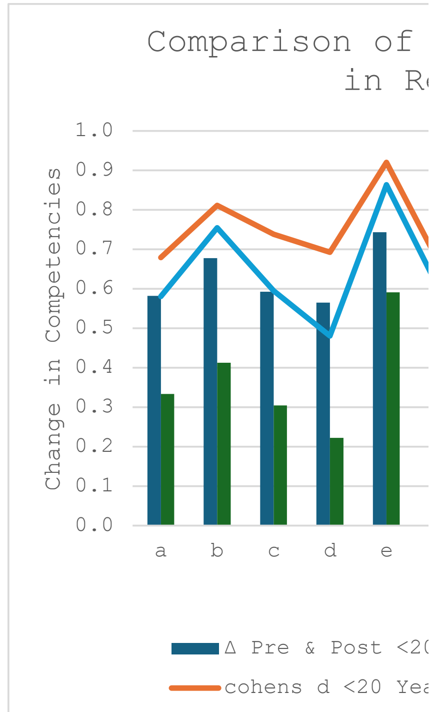
0.645

over 20 years

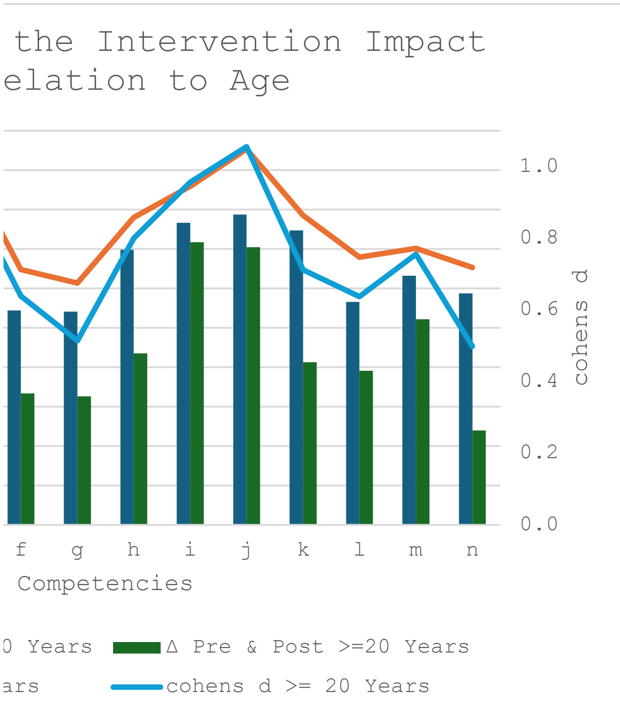
	Δ Pre & Post >=20	Standard deviation	T
a	0.333	0.522	4.282
b	0.413	0.498	5.627
c	0.304	0.465	4.437
d	0.222	0.420	3.546
e	0.591	0.622	6.302
f	0.333	0.522	4.282
g	0.326	0.634	3.486
h	0.435	0.544	5.423
i	0.717	0.750	6.486
j	0.705	0.668	7.001
k	0.413	0.580	4.828
l	0.391	0.614	4.323
m	0.522	0.691	5.122
n	0.239	0.480	3.379

0.425

df	Zweiseitiges p		cohens d <20 Years
188	0.000		0.747
185	0.000		0.892
193	0.000		0.812
192	0.000		0.762
190	0.000		1.013
192	0.000		0.713
193	0.000		0.675
191	0.000		0.858
192	0.000		0.945
192	0.000		1.049
193	0.000		0.863
190	0.000		0.747
192	0.000		0.772
193	0.000		0.719



df	Zweiseitiges p		cohens d >= 20
44	0.000		0.638
45	0.000		0.830
45	0.000		0.654
44	0.001		0.529
43	0.000		0.950
44	0.000		0.638
45	0.001		0.514
45	0.000		0.800
45	0.000		0.956
43	0.000		1.055
45	0.000		0.712
45	0.000		0.637
45	0.000		0.755
45	0.002		0.498



	Ohne Abschlu Δ Pre & Post no
a	0.625
b	0.864
c	0.577
d	0.569
e	0.774
f	0.588
g	0.509
h	0.725
i	0.660
j	0.784
k	0.717
l	0.686
m	0.580
n	0.588
	0.661

	Hauptschulab Δ Pre & Post High
a	0.727
b	0.776
c	0.701
d	0.652
e	0.785
f	0.612
g	0.712
h	0.754
i	0.864
j	0.776
k	0.788
l	0.682
m	0.657
n	0.687
	0.727

uss

Standard deviation	T	df	Zweiseitiges p	cohens d no degree	
0.841	5.148	47	0.000	0.743	a
0.878	6.521	43	0.000	0.983	b
0.871	4.776	51	0.000	0.662	c
0.831	4.888	50	0.000	0.684	d
0.724	7.775	52	0.000	1.068	e
0.804	5.222	50	0.000	0.731	f
0.775	4.784	52	0.000	0.657	g
0.827	6.268	50	0.000	0.878	h
0.854	5.632	52	0.000	0.774	i
0.673	8.326	50	0.000	1.166	j
1.063	4.911	52	0.000	0.675	k
0.761	6.437	50	0.000	0.901	l
0.950	4.319	49	0.000	0.611	m
0.779	5.392	50	0.000	0.755	n

schluss

Standard deviation	T	df	Zweiseitiges p	cohens d High	
0.775	7.619	65	0.000	0.938	
0.670	9.480	66	0.000	1.158	a
0.697	8.242	66	0.000	1.007	b
0.794	6.666	65	0.000	0.820	c
0.820	7.719	64	0.000	0.957	d
0.717	6.988	66	0.000	0.854	e
0.855	6.765	65	0.000	0.833	f
0.811	7.497	64	0.000	0.930	g
0.857	8.184	65	0.000	1.007	h
0.735	8.645	66	0.000	1.056	i
0.869	7.370	65	0.000	0.907	j
0.807	6.865	65	0.000	0.845	k
0.808	6.652	66	0.000	0.813	l
0.908	6.189	66	0.000	0.756	m
					n

mittlere Reife

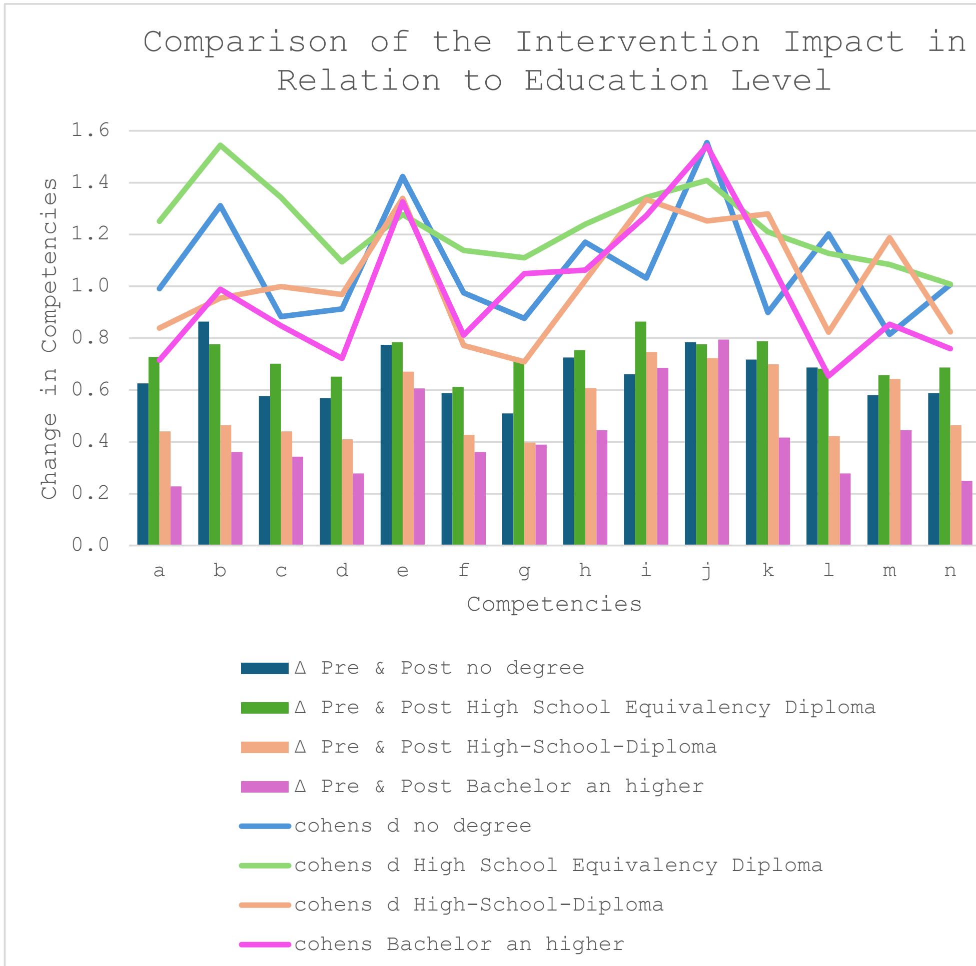
Δ Pre & Post High-	Standard deviation	T	df	Zweiseitiges p	cohens d High-School-Diploma
0.440	0.700	5.765	83	0.000	0.629
0.464	0.648	6.563	83	0.000	0.716
0.440	0.588	6.865	83	0.000	0.749
0.410	0.564	6.618	82	0.000	0.726
0.671	0.668	9.097	81	0.000	1.005
0.427	0.738	5.241	81	0.000	0.579
0.398	0.748	4.843	82	0.000	0.532
0.607	0.792	7.028	83	0.000	0.767
0.747	0.746	9.117	82	0.000	1.001
0.723	0.770	8.552	82	0.000	0.939
0.699	0.728	8.744	82	0.000	0.960
0.422	0.683	5.626	82	0.000	0.617
0.643	0.722	8.159	83	0.000	0.890
0.464	0.752	5.661	83	0.000	0.618

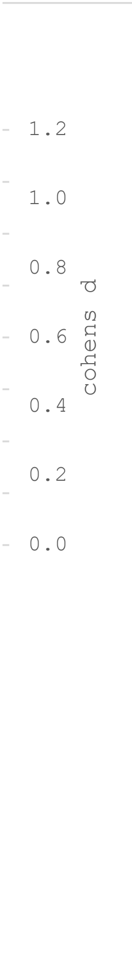
0.540

Abitur und höhe

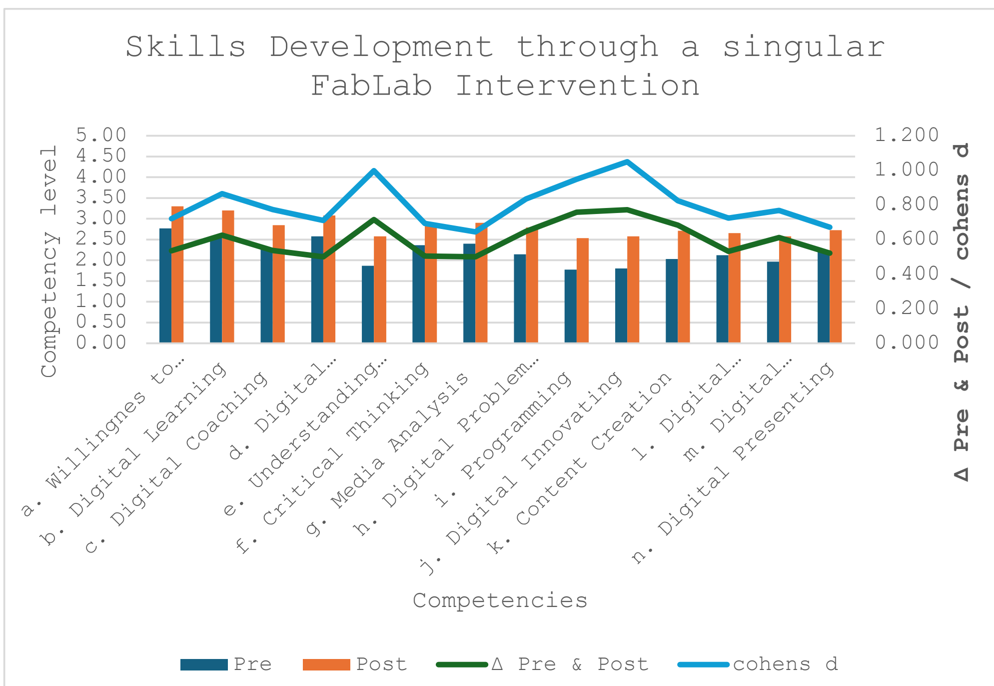
Δ Pre & Post	Standard deviation	T	df	Zweiseitiges p	cohens Bachelor an higher
0.229	0.426	3.174	34	0.003	0.536
0.361	0.487	4.448	35	0.000	0.741
0.343	0.539	3.762	34	0.001	0.636
0.278	0.513	3.247	35	0.003	0.541
0.606	0.609	5.714	32	0.000	0.995
0.361	0.593	3.654	35	0.001	0.609
0.389	0.494	4.719	35	0.000	0.787
0.444	0.558	4.781	35	0.000	0.797
0.686	0.718	5.648	34	0.000	0.955
0.794	0.687	6.744	33	0.000	1.157
0.417	0.500	5.000	35	0.000	0.833
0.278	0.566	2.943	35	0.006	0.491
0.444	0.695	3.839	35	0.000	0.640
0.250	0.439	3.416	35	0.002	0.569

0.420

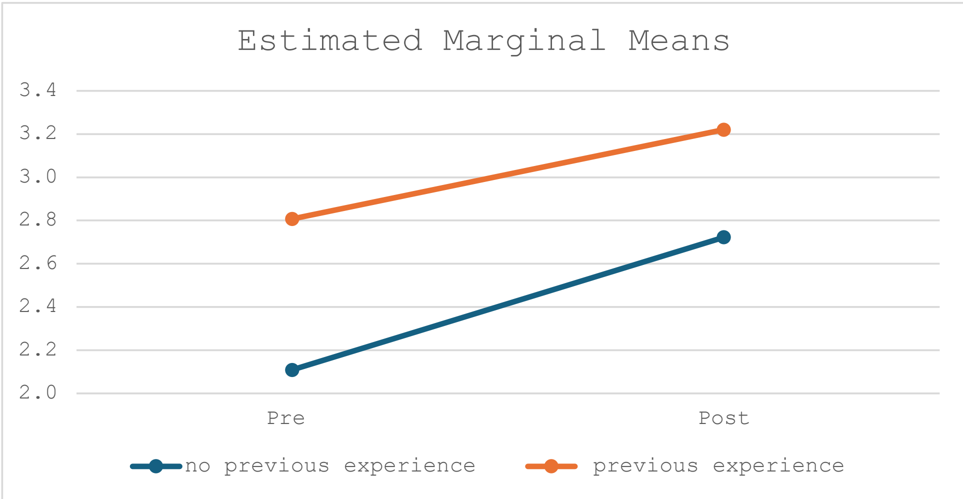

Comparison of the Intervention Impact in Relation to Education Level
Change in Competencies
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
a
b
c
d
e
f
g
h
i
j
k
l
m
n
Competencies
Δ Pre & Post no degree
Δ Pre & Post High School Equivalency Diploma
Δ Pre & Post High-School-Diploma
Δ Pre & Post Bachelor an higher
cohens d no degree
cohens d High School Equivalency Diploma
cohens d High-School-Diploma
cohens Bachelor an higher



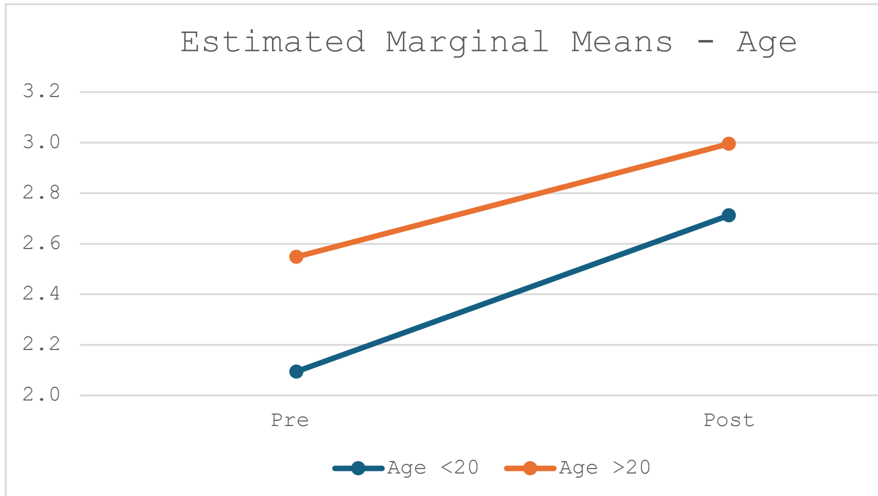
	Pre	Standard deviation	Post	Standard deviation	Δ Pre & Post	Standard deviation	cohens d
a. Willingnes	2.77	1.059	3.30	0.925	0.534	0.742	0.720
b. Digital Lea	2.58	1.082	3.20	0.966	0.625	0.722	0.866
c. Digital Coa	2.31	1.069	2.85	0.992	0.538	0.696	0.773
d. Digital Info	2.58	1.166	3.08	1.009	0.500	0.704	0.710
e. Understanc	1.86	0.942	2.58	0.994	0.715	0.716	0.999
f. Critical Thi	2.37	1.078	2.87	1.057	0.504	0.728	0.693
g. Media Ana	2.40	1.062	2.90	1.038	0.500	0.776	0.644
h. Digital Pro	2.14	1.009	2.79	0.997	0.647	0.775	0.835
i. Programmir	1.78	1.019	2.54	1.064	0.757	0.799	0.948
j. Digital Innc	1.81	0.932	2.58	1.029	0.772	0.736	1.050
k. Content Cr	2.03	1.033	2.71	1.045	0.683	0.828	0.825
l. Digital Inte	2.12	0.990	2.65	0.986	0.532	0.734	0.725
m. Digital Co	1.97	0.970	2.58	1.066	0.611	0.796	0.767
n. Digital Pre	2.20	1.008	2.73	0.993	0.521	0.776	0.671



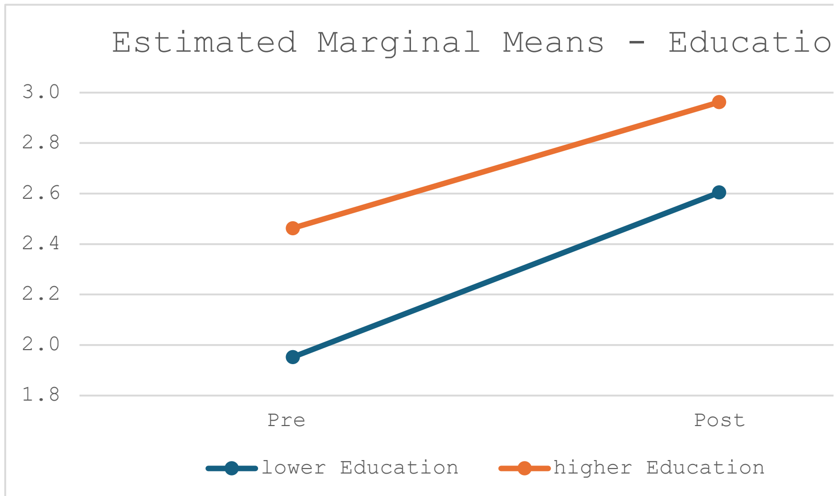
Time	Pre	Post
no previous experience	2.1092	2.7223
previous experience	2.8075	3.2205



Time	Pre	Post
Age <20	2.0943	2.7121
Age >20	2.5482	2.9954



Time	Pre	Post
lower Educati	1.9524	2.6043
higher Educa	2.4632	2.9623



n

#	Reviewers comment	Changes	Area
4	The layout differs within the work. Some paragraphs are aligned to the edge of the page, others to the left edge. A united design is needed for this work	Thank you for the feedback. Indeed, there were some formatting errors. These have been carefully corrected to ensure that the manuscript now follows a consistent design.	all
4	It seems that there is missing a below part of the Figure1 (p.8).	Thank you for the valuable comment. The table has been better integrated into the text, and a clear reference has been provided.	3.4
4	Maybe there is a possibility to reorganize Figures or choose different layouts, so that the text (competencies) is not missing in some of them.	Thank you for the valuable suggestion. The figures have been revised with improved readability in mind. All figures now also include the titles of the respective competencies.	4
5	The manuscript indicates that the research design follows a "pre and post-test" design, but that is not an accurate description of a research design, just that data were collected at two time points. There is not enough justification this design is sufficient for "...isolating the effect of the intervention on participants' digital competencies.	Thank you for the valuable comment. The rationale and justification for the chosen methodology have been significantly revised and supported with additional literature. Furthermore, the contextual conditions that prevented the implementation of an alternative and more robust methodology (e.g., a control group) have been explained in greater detail.	3.1
5	In order to make that claim, there would need to be much more control of the delivery of the intervention that also included a control group that received some kind of standard practice of education. These competencies reflect higher order skills such as the ability to "create," so it is unclear why the study did not include a more appropriate assessment of the participants' ability to use their skills.	Thank you for the valuable feedback. The limitations have been expanded to include the mentioned aspects, and a critical reflection has been conducted. Unfortunately, implementing the suggested measures to enhance quality was not feasible within the scope of the study. The reasons for this have also been outlined, along with an assessment of the study's overall significance.	6
5	There is not a presentation nuanced theoretical framework or conceptualization of these important competencies and how each of them are mapped onto the different kinds of activities that happen in the lab. Rather, the manuscript indicates that different ones were selected because they were "targeted by the intervention." However, the intervention comprised different sub-activities and there is not enough description of the activities to understand how many of the activities contribute to each competency	Thank you for this justified remark. To enable a more transparent reconstruction of the study, a mapping of the individual addressed competencies to the mini-workshops has been conducted. Furthermore, these have been described more comprehensively and precisely to enhance the clarity of the assignment. By providing a more detailed description of the content, a more accurate transfer for future studies is also facilitated. Additionally, the theoretical framework has been strengthened and further elaborated.	3.1, 3.2, 5
5	. It seems that, for the study of a specialized IDE, there is very little information about	Thank you for the remark. The described DIE is not a specialized environment but	3.1

	that environment and what the mechanisms are for increasing skills in the specific competencies.	rather a typical example in accordance with the established definition. This general applicability facilitates the transfer of findings to other DIEs, as these environments must adhere to identical standards regarding equipment, setup, and offerings to qualify as a DIE. Nevertheless, a detailed description of the DIE used in the study has been provided, with a reference made to the core criteria outlined in the introduction under topic 2.	
5	It is also quite concerning that the participants were observed during the process of completing the analog questionnaires, which may have contributed to social desirability bias on behalf of the participants. The researchers also indicate that they observed some participants completing the questionnaire very quickly and decided to omit some of these participants from the analysis. It does not appear that the researchers applied a standard rule or some kind of "attention check" item in the analog survey itself to determine if the participants were reading the items. The lack of a standard, verifiable decision rule for deleting participants' data is quite concerning.	Thank you for the valuable feedback. The mistaken impression that participants were closely observed while completing the questionnaire has been corrected, and the process has been described more clearly. Additionally, the decision criteria for data cleaning have been revised and formulated more precisely. The justified concern regarding the absence of a safeguard instrument has been acknowledged in the limitations and critically reflected upon.	3.3, 5, 6
5	There are other aspects of the research design that are not adequately justified, such as separately analyzing the data of participants who had prior experience with IDE and the data of the participants without any experience. This leads to conducting two separate paired-samples t-tests and then an attempt to compare the results separately, which is highly unusual and not adequately justified. It is not possible to make a comparison of the association of experience vs. no experience with the competencies without doing one test with all participants, such as an ANCOVA in which there would be binary indicator for prior experience. This pattern of breaking sub-groups into different datasets for their own statistical tests is conducted with other aspects of the data (such as examination of the results for students with different levels of education).	Thank you for the valuable suggestion. Following extensive additional research, the methodology used to differentiate the individual subgroups based on demographic characteristics was revised. A mixed ANOVA analysis was conducted for each of the criteria: age, level of education, and prior experience. The relevant assumptions for these analyses were tested and thoroughly documented. The complete analysis results can be found in the accompanying SPSS output.	4.3
5	Even though the authors claim that participants' competencies increased as a result of the intervention, it is actually the	Thank you for the feedback and the justified criticism. The weakness of the chosen methodology has been addressed	3.1, 6

	perceptions that increased without any attempt to more accurately measure an actual gain in competencies that emphasized doing and not how one thinks their knowledge grew after participating in an event.	in greater detail within the limitations and the research design. Additionally, a more comprehensive rationale for the methodology was provided, along with an explanation of the constraints that limited the choice of methods.	
6	While the age of participants is specified in the results, it might be useful to indicate, when discussing the experimental design, the overall age ranges of participants, as it was not initially clear to this reviewer if the experiment was conducted with adult learners or with people still in initial formation until much later in the text. A single sentence would probably suffice for this.	Thank you for the valuable comment. A brief description of the participant group has been added to the research design. This includes both the age range and the spectrum of educational qualifications.	3.1
6	I would like to have seen a bit more analysis about the role of social interaction in the acquisition of competencies, something that is mentioned in passing, but seems to me to be important.	Thank you for the feedback. Unfortunately, social interaction was not a central focus of the study, so no specific methods were established to provide a well-founded conclusion in this regard. Nevertheless, the issue was addressed as a supplementary aspect, and a general subjective perception was included to emphasize the relevance of social interaction.	5
6	Likewise, it would be interesting to see a discussion of how the lessons learned from this experience could be applied, for example, in retraining people who lose their jobs due to automation or the introduction of AI into their workflow. It might also be useful in developing retraining methods for people whose major work experience to date is more physical than intellectual, and whose talents put the focus more on learning by doing than learning by study.	Thank you for the valuable comment. The motivation behind each of the mini-workshops has been expanded, with a stronger emphasis on their connection to industrial applications. Additionally, the necessity for the specific target group was further elaborated, thereby enhancing the study's relevance and creating significant added value.	3.2
6	My last comment is that given the large sample size, it would be interesting to have a more fine-grained examination of differences by age - for example, breaks at 30 and 40, to see if there are noticeable differences.	Thank you for the helpful feedback. A more detailed differentiation by participants' age was intended; however, of the 242 participants, 196 belonged to the under-20 age group. Consequently, the sample size for the remaining age groups was too small to derive significant conclusions. For this reason, all other age groups were combined. Further investigation based on the available data was deemed inconclusive.	4.3.3