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The impact of different psychoeducational approaches in people with and without mental disorders. Video watching versus text reading and learning outcome

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Riepilogo

Obiettivo. Questo studio indaga l'efficacia dell'utilizzo di video e testi come strumento psicoeducativo in persone sane e pazienti psichiatrici.

Background. Studi precedenti che hanno paragonato l'efficacia di video e testi in persone sane hanno riportato risultati contrastanti, alcuni in favore di video e altri in favore di testi. Video e testi vengono spesso utilizzati in interventi online per pazienti psichiatrici. In particolare, i video permettono di presentare contenuti psicoeducativi in modo più attrattivo e contrastare sia la bassa aderenza al trattamento, sia gli alti tassi di drop-out che caratterizzano questo tipo di interventi. Tuttavia, fino ad ora, nessuno studio ha indagato l'efficacia di video e testi come strumenti psicoeducativi in pazienti psichiatrici.

Metodo. Sulla base dei risultati del Web Screening Questionnaire (WSQ), i partecipanti sono stati suddivisi in persone sane e pazienti psichiatrici. Per valutare l'apprendimento dei partecipanti è stato sviluppato un test di conoscenza ad hoc che consisteva in un test a scelta multipla con domande riguardo agli argomenti trattati. Inoltre, i partecipanti dovevano indicare per ogni domanda, quanto fossero sicuri su una scala da 1-100 della propria risposta. Tale strumento è stato utilizzato sia per valutare la conoscenza baseline (baseline-test), sia per valutare l'apprendimento dopo la presentazione del materiale psicoeducativo (post-test). Due sono gli argomenti che sono stati affrontanti nei video/testi: i disturbi del sonno e la competenza sociale. Dopo aver completato il WSQ e il baseline-test, i partecipanti sono stati randomizzati in uno dei seguenti gruppi: video vs. testo, testo vs. video, video vs. video, testo vs. testo, gruppo di controllo. Dopo la presentazione del materiale psicoeducativo, i partecipanti hanno completato il post-test.

Risultati. La conduzione di un'ANOVA a misure ripetute ha mostrato un aumento significativo della conoscenza (F=80.07, p<.001) e del grado di sicurezza con cui i partecipanti hanno risposto alle domande (F=55.34, p<.001) dal baseline-test al post-test, senza differenze significative tra gli strumenti psicoeducativi (video vs. testo) e tra persone sane e pazienti psichiatrici.

Tuttavia, sono state trovate differenze significative tra i gruppi (persone sane vs. pazienti psichiatrici) per le variabili genere (p=.033), titolo di studio (p=.002), carico cognitivo intrinseco (p=.035) e interesse per il tema disturbi del sonno (p<.001). La conduzione di un'ANCOVA a misure ripetute in cui sono state inserite come covariate questi fattori, non ha confermato i risultati, non mostrando un incremento significativo della conoscenza (F=1.94, p=.167) e del grado di sicurezza con cui i partecipanti hanno risposto alle domande (F=0.17, p=.682) dal baseline-test al post-test.

Conclusioni. I risultati suggeriscono che video e testi sono entrambi strumenti psicoeducativi efficaci, senza differenze significative tra i due e tra persone sane e pazienti psichiatrici. Tuttavia, vi è l'esigenza di una maggiore evidenza empirica per confermare questi risultati. Studi futuri su questo argomento, dovrebbero assicurarsi di controllare per differenze tra il gruppo di persone sane e pazienti psichiatrici.

Abstract

Objective. The present study investigates the effectiveness of videos and texts as learning instruments by comparing them between healthy controls and psychiatric patients.

Background. Previous studies that investigated the effectiveness of these learning instruments in healthy controls found contrasting results, with some in favor of texts and some in favor of videos being more effective. Videos and texts are often used in internet-based interventions for psychiatric patients. Videos permit to present psychoeducational content in a more appealing way and to counteract low adherence and high drop-out rates. However, up until know, the effectiveness of videos and texts as learning instruments in psychiatric patients had not been studied.

Methods. Based on their results on the Web screening questionnaire (WSQ), participants were divided into the group of psychiatric patients or healthy controls. To evaluate the learning process of the participants, a multiple-choice test was designed ad hoc. This contained questions about the arguments of the videos/texts and every participant had to indicate on a scale 1-100, how confident he was with his answer. The present test served as baseline- and post-test. Every participant learned about two topics, sleep disturbances and social competence. After completing the WSQ and the baseline-test, the participants were randomized in one of the following groups: video vs. text, text vs. video, video vs. video, text vs. text, control group. After this, they completed again the post-test.

Results. A repeated measures ANOVA showed a significant increase of knowledge (F=80.07, p<.001) and confidence scores (F=55.34, p<.001) from baseline- to post-test, with no significant differences between learning instrument and between psychiatric patients and healthy controls. However, group differences (psychiatric patients vs.

healthy controls) were found for the variables gender (p=.033), education (p=.002), intrinsic cognitive load (p=.035) and interest for sleep disturbances (p<.001). A repeated measures ANCOVA with these variables as covariates, did confirm the previous results, showing no significant increase of knowledge (F=1.94, p=.167) and confidence scores (F=0.17, p=.682) from baseline- to post-test.

Conclusions. The findings of the current study suggest that videos and texts are both effective learning instruments with no difference between learning instrument and between psychiatric patients and healthy controls. However, there is the need of more evidence, to confirm these results. Feature studies that aim to bring more evidence regarding this research topic, should make sure to control for group differences between psychiatric patients and healthy controls.

Chapter 1: Introduction

Videos and texts are often used as psychoeducational instruments for psychiatric patients, but are they really effective? This question is especially interesting, in the case of videos. In fact, videos are often used in internet-based interventions for psychiatric patients to present the content in a more appealing way (Bücker, Schnakenberg, et al., 2019; Bücker, Westermann, et al., 2019) and to address the problem of low adherence and high dropout rates of internet-based interventions (Melville et al., 2010; Wangberg et al., 2008). Moreover, it has been shown that internet-based interventions that included multimedia content (e.g. videos), showed significantly lower dropout rates than interventions that only included written text. However, up until know, there are no studies that investigated the effectiveness of videos and texts as learning instruments in psychiatric patients. However, there are some studies that investigated the effectiveness of both in healthy individuals. These found contrasting results, with some indicating that texts are more effective (Furnham & Gunter, 1987; Walma Van Der Molen & Van Der Voort, 2000) and some indicating that videos are more effective (Chi et al., 2014; Lim et al., 2020; Schuelper et al., 2019). Therefore, the present study represents the first investigation of texts-based and video-based learning in psychiatric patients. Additionally, the current study brings more evidence for the effectiveness of video- vs. text-based learning instruments in healthy individuals. Furthermore, it investigates if there are any differences between the two groups of healthy and psychiatric individuals.

Chapter 2: Theoretical background

2.1 Learning theories

The conception of what learning means changed a lot through history. Back in 385 B.C.E, the Greek philosopher Plato, starting from the paradox "if a person knows something, she doesn't need to question it, and if a person does not know something, she can't question it" (Oxford, 1922), proposed the theory of recollection, which states that knowledge is innate (Oxford, 1922). Plato described learning as a passive process where knowledge is already present at birth into our soul. All information learned by a person is a recollection of something that the soul already learned (Oxford, 1922). This theory automatically elicits the question: how did our soul gain the knowledge in the first place? In contrast to Plato, in 1690 Locke proposed the blank slate theory (Locke, 1690). He stated that humans are born into the world with no innate knowledge. In contrary, according to Locke the human mind at birth is a sort of "blank slate" ready to be influenced by the environment (Locke, 1690). Locke thought that experience is made through sensation, which informs us about things and processes in the external world, and reflection, which tells us about the operations of our own minds (Locke, 1690). These two theories are classical conceptions of knowledge, which can still help better understand learning today. In the early 1900s, a specific branch of psychology was born, that started to study with a scientific approach how humans learn. This new branch is called educational psychology. Over the years, educational psychology has studied human learning with different approaches. The first psychological approach, which also gave birth to educational psychology, was behaviorism. The term "behaviorism" was coined in 1913 by John Watson, who stated that behaviorism is a purely objective branch of natural science and

has the goal to predict and control behavior (Watson, 1913). From a behaviorist point of view, learning is considered as the acquisition of new behavior through conditioning or social learning (Bandura, 1971; Pavlov, 1903; Skinner, 1971).

At the beginning of the 20th century, based on the observation that we often experience things that are not a part of our simple sensations, the gestalt psychology approach was born. This movement, starting from the statement "the whole is more than the sum of its parts", emphasized the need to study the human mind as a whole (Yount, 1996). In support of their theory, gestalt psychologists provided demonstrations that showed how we organize our sensations into perceptions. For example, if we draw an incomplete circle on a piece of paper, we tend to perceive it as complete (Brennan & Houde, 2017). These gestalt principles are not restricted to perception. In fact, gestalt psychologists, argued that we often learn not the literal things in front of us, but the relations between them (Boeree, 2000).

The cognitive approach criticized behaviorists for not considering the fact that the way people think impacts their behavior. Cognitivists argued that cognition plays an important role in learning and therefore it must be included in its study (Lilienfeld et al., 2010). With the advent of memory theories like the Atkinson-Shiffrin memory model (Atkinson & Shiffrin, 1968) and the Baddeley's working memory model (Baddeley & Hitch, 2009) the cognitive approach gained more popularity. Research started focusing more on information processing essentially comparing human thinking to a computer that processes information (Çeliköz et al., 2019). Learning research started to investigate how information is received, how it is processed, how it is organized into already existing schemas and how information is retrieved upon recall (Ertmer & Newby, 2013).

In today's cognitive psychology, cognitive load is a central research topic. The cognitive load theory is based on the assumption that the working memory is limited in capacity and duration and that information will only be stored in long term memory after being processed by the working memory (Sweller, 2011). This theory postulates that, anything that consumes the capacity of the working memory is called cognitive load (Sweller, 2011). According to this theory, an overload of the working memory would lead to the fact that not all information can be processed correctly and has a negative impact on the learning process (Sweller, 2011).

Recently, the multimedia learning theory has been proposed, which tries to explain how we learn from multimedia material (Mayer, 2005). Mayer defines multimedia as presenting both words (such as spoken text or printed text) and pictures (such as illustrations, photos, animation, or video). The theory is based on three assumptions (Mayer, 2005). The dual-channel assumption, which postulates that humans possess separate channels for processing visual and auditory information (Baddeley & Hitch, 1974; Paivio, 1986). The limited capacity assumption, which postulates that humans are limited in the amount of information that can be processed in each channel at one time (Baddeley & Hitch, 1974; Miller, 1956). The active processing assumption, which postulates that humans engage in learning by attending to relevant incoming information, organizing selected information into coherent mental representations, and integrating mental representations with other knowledge (Mayer et al., 1999). According to this theory, when we study from multimedia material, information is processed by the auditory channel, which processes information that is heard, and by the visual channel, which processes information that is seen. Because the processing capacity in memory is limited, words and images are selected and organized in verbal and pictorial models in

the working memory. These are then integrated together with prior knowledge in the long-term memory. Supporters of this theory argue that people learn more deeply from words and pictures than from words alone, which is referred as the multimedia principle (Mayer, 2005). This is because words and pictures are qualitatively different and thus can complement one another. Words can present better representations that are more abstract and require more effort to translate and pictures can present better more intuitive and natural representations (Mayer, 2005).

2.2 Video-based learning

Video-based learning (VBL) is defined as the knowledge or skills acquired through a video (Sablić et al., 2021). The U.S. Army was the first institution that, back in the year 1950, used television for military training (Kanner, 1958). Back then, these installations utilized instruments such as film chains and kinescope equipment (Kanner, 1958). The studies that have been conducted on these installations have shown that television instructions are at least as effective as regular instruction given by an instructor (Kanner, 1954). Furthermore, the use of television has shown advantages, such as: enrichment of the information available to a regular classroom, for example when only one piece of equipment is available, television can be used to familiarize large groups of trainees with the equipment; close-up advantages of the television camera, by permitting trainees to see small features of some equipment; economic advantages, since more classes can learn simultaneously by one recorded instructor (Kanner, 1958).

In 1968 a study was conducted on the effectiveness of educational television in an elementary school (Ledford, 1968). Educational television programs were incorporated as a regular part of the curriculum from the first to sixth grade. Teachers described the

learning performance of the students as average and noted a marked decrease in discipline problems due to an increased motivation of the students to learn. In 1975 a review on the effectiveness of learning from television was published, which concluded that children and adults learn a lot from instructional television (Chu & Schramm, 1975).

In the 1980s, due to the development of VHS (Video Home System), film material became much more accessible to everyone and thus more easily useable in classrooms (Sablić et al., 2021). Around the year 2000, with the introduction of internet in wider society and the development of new technologies (e.g. notebooks, smartphones), the integration of videos into education was even more facilitated (Sablić et al., 2021). This had a big impact on education, introducing for example the e-learning approach (Kolekar et al., 2018) or new instruments like lecture capture technologies (Sloan & Lewis, 2014). The e-learning approach is a new teaching method based on the use of electronic media and devices (Sangrà et al., 2012). Lecture capture technologies are platforms that capture everything that happens during a class session (video, audio, slides, virtual whiteboard, etc.) (Sloan & Lewis, 2014). One study showed that students that had access to lecture capture technologies showed an increased performance on exams (Sloan & Lewis, 2014). Consequently, a lot of research on the use of videos in education has been done, that showed a positive effect of these instruments on learning performance. Giannakos and colleagues in the year 2014 found that videos make it possible to overcome the practical limitations of the real world (Giannakos et al., 2014). For example, students can watch on one video more recordings (e.g. of a lecture, of the instructor, the projected slides and the information presented by the instructor via computer) to build a multi video object (Giannakos et al., 2014). In other words, one advantage of videos is that they can be used to present the information in different types of forms and also present more information

at one time. One study showed that adding interactive learning-videos, where questions were displayed to the participants while they were watching the video, to traditional learning methods showed a positive impact of this instrument on learning performance. (Wachtler et al., 2016). In fact, students that learned from these videos, showed a higher performance at a test, than students than only used traditional teaching methods. Another study showed that videos are a particularly interesting learning instrument for students who prefer to learn by watching, so called visual learners, and who learn best by watching short-form videos rather than just listening or reading instructional materials (Korkut et al., 2015). Zhang and colleagues found that interactive videos can enhance learning performance of students and increase their satisfaction (Zhang et al., 2006). Also Liao and colleagues found that instructional videos had a positive effect on learning achievement (Liao et al., 2019). Furthermore, the results of this study showed that instructional videos combined with collaborative learning have a positive effect on students' intrinsic motivation.

It is widely accepted that students motivation is a key element in the learning process (Pintrich, 1999). Various studies showed positive effects of videos on students' motivation (Bravo et al., 2011; Laksmi et al., 2021). One of these studies showed that the use of videos has a positive effect on students' perception regarding the enhancement of their learning motivation (Bravo et al., 2011). The aim of this project was to investigate the positive and negative effects of low-cost educational videos in the learning process. These effects were examined through qualitative instruments like semi-structured interviews or questionnaires that included open questions, which brings new type of support as many prior studies used quantitative instruments. The results showed that participants general opinion is that low-cost videos are an innovative teaching material

and have a positive effect on students' motivation. In another study, videos were used as an intervention in a class where students showed low learning motivation (Syaparuddin & Elihami, 2020). In this case, the teachers subjectively observed the students showing low learning motivation (students arriving late, not doing assignments, not paying attention to the lesson, being less active), motivation was assessed through a questionnaire. The results from the questionnaire showed that students learning motivation was low. After the use of videos as a learning innovation, students showed a significant increase in learning motivation in the questionnaire. Furthermore, also other studies showed a positive effect of videos on students motivation (Barut Tugtekin & Dursun, 2021; Choi & Johnson, 2005; Ramsay et al., 2012).

A review article published in 2021 which analyzed a vast number of articles that studied video-based learning with a scientific approach, concluded that videos are becoming a very powerful learning media that captures and distributes information while also providing a stimulating learning environment (Sablić et al., 2021). The authors stated that video-based learning increases students' satisfaction and that videos can attract students' attention, motivate them, and thus increase their in-class participation.

While there are numerous studies on the effectiveness of videos as a learning instrument, relatively little is reported on the comparison between videos-based learning and text-based learning. Overall, there seem to be contrasting results in literature. One study from 1985 found that memory performance in students was best when the content was presented in print compared to video (Furnham & Gunter, 1987). Also Walma Van der Molen and Van der Voort found an overall lower knowledge acquisition from videos than from texts (Walma Van Der Molen & Van Der Voort, 2000). However, in these two studies the videos were presented in broadcast mode in which it is not possible for the

viewer to control the video's flow of information. In contrast, in a study where participants were given the opportunity to control the flow of information by a start/stop, a forward and a rewind button, students that learned through videos showed higher learning performances than students that learned through texts (Merkt et al., 2011). This suggests that when you compare text-based learning with video-based learning, it seems to be crucial to give the participants in the video-based learning condition to control the flow of information, just as the participants in the text-based learning condition. As this study, there are also other studies that showed a higher learning performance in participants that learned from videos compared to participants that learned from texts (Chi et al., 2014; Lim et al., 2020; Schuelper et al., 2019).

So far, we discussed that video-based learning has shown to be effective and that it can have some advantages. However, this should not be taken to mean that video-based learning should substitute other traditional teaching methods. In fact, students that learned from videos instead of classical lectures, reported as disadvantages the loss of contact with the lecturer, the loss of effective discussions and no contact with the peers (Alshammari, 2019). Therefore, videos should be considered more as an upcoming learning instrument, that can be used effectively in different contexts. Specifically in an educational context, it should be used as an extra, next to the other classical teaching methods.

2.3 Cognitive load

The cognitive load theory is a theoretical model that provides a framework for the investigation of cognitive processes, by considering the structure of information and the cognitive architecture that allows the learner to process that information (Paas et al.,

2003). The first to describe the cognitive load concept was Sweller back in 1988 (Sweller, 1988). He was interested in testing if the practice on a large number of conventional problems is the best way of gaining problem-solving skills. He found that conventional problem-solving requires a relatively large amount of cognitive process capacity which is consequently unavailable for the learning process. In contrast to what was sustained at the time, he concluded that problem-solving is an ineffective learning device (Sweller, 1988). Since then, the cognitive load theory has been further developed and today it has become a very influential theory in educational psychology (Paas et al., 2010).

The cognitive load theory is based on a model of our memory in which the information is elaborated by the working memory before it is stored in the long-term memory (Aktinson & Shiffrin, 1968; Baddeley & Hitch, 1974; Ericsson & Kintsch, 1995). The idea is that the working memory is responsible for the processing and linking of the information (Dosher, 2003). According to Miller our working memory has limited capacity (Miller, 1956). Apart from individual differences ("plus or minus 2), approximately seven isolated bits of information can be stored simultaneously in the working memory (Miller, 1956). Furthermore, information can be stored in the working memory for a maximum of 60 seconds (Dosher, 2003). On the other hand, the long-term memory has a very long storage period and can store a very large amount of information (Ericsson & Kintsch, 1995; Sweller, 2005). Basing on the assumption that the working memory is limited in its capacity, the cognitive load theory postulates that anything that consumes part of this limited capacity is defined cognitive load (Sweller, 1988). An overload of the working memory leads to the fact that not all information can be processed, and this has a negative effect on the learning process (Sweller, 1988; Sweller et al., 1990).

The cognitive load theory distinguishes three different types of cognitive load: intrinsic load, extraneous load and germane load (Paas & Van Merriënboer, 1994; Sweller, 1994). In contrary to intrinsic and extraneous load, germane load was added to the cognitive load framework based on theoretical considerations rather than on specific empirical results (Kalyuga, 2011). In fact, there are hardly any studies that attempt to provide empirical evidence of germane load, which has led to an increased critic of this concept (Kalyuga, 2011; Sweller, 2010). Because of this, we will not further discuss this type of cognitive load. Intrinsic load represents that part of cognitive load that depends from the complexity of the material that we intend to learn (Sweller, 1994). Sweller suggests that this complexity depends on what he defines element interactivity, which is the number of interacting elements that must be acquired simultaneously in order to learn a particular task or procedure (Sweller, 1994). Extraneous cognitive load represents that part of cognitive load, that depends on how the material is presented to the learner (Sweller, 1994). For example, adding a series of statements and descriptions to an already self-explanatory diagram can increase extraneous cognitive load and unnecessarily force students to process the text, having rather negative than positive effects (Chandler & Sweller, 1991).

There are two main arguments proposed by research in favor of the hypothesis of video-based learning being more cognitive demanding than text-based learning. One is the so-called transient information effect described by Leahy and Sweller (Leahy & Sweller, 2011). When transforming written text into spoken information we transform relatively permanent information into transient information. Given the capacity and duration limits of the working memory, the use of transient information may cause excessive working memory load (Leahy & Sweller, 2011). In fact, research has shown that permanent

information outperformed transient information in terms of learning outcomes (Castro-Alonso et al., 2018). Another argument in favor of video-based learning being more cognitive demanding than text-based learning is the split-attention principle (Ayres & Sweller, 2005). This principle states that when we present different sources of information (e.g. visual and auditive) to a learner, attention must be split between these multiple sources (Ayres & Sweller, 2005). Consequently, these sources have to be mentally integrated, which increase extraneous load (Ayres & Sweller, 2005).

To the best of our knowledge, there are not many studies that compared cognitive load caused by video-based learning with cognitive load caused by text-based learning. However, those studies that investigated this argument did not find significant differences between the two (Hefter & Berthold, 2020; Hoogerheide et al., 2014; Kramer et al., 2020). Moreover, one study even found that individuals who prefer to acquire new information in visual format, so-called visual learners, experienced a lower cognitive load when they learned from a video-lecture with synchronized slides compared to when they learned from just the audio of the lectures with synchronized slides. Individuals who preferred to acquire new information in verbal format showed the opposite pattern (Homer et al., 2008).

2.4 Video-based learning in individuals with mental disorders

As described in the paragraph 2.2, there is evidence in literature showing that videos can be used effectively as a learning tool in healthy individuals. However, to the best of our knowledge, there are no studies to date directly investigating the effectiveness of video-based learning in individuals with mental disorders. Videos are often used as learning instruments in internet-based interventions for individuals with mental disorders (Braun

et al., 2021; Rachamim et al., 2021; Bücker, Schnakenberg, et al., 2019; Miegel et al., 2019). For example, two of these studies were conducted on individuals with depressive symptoms (Braun et al., 2021; Bücker, Schnakenberg, et al., 2019). In these cases, the internet-based interventions consisted in trainings targeting depressive symptoms, insomnia, stress, sleep disturbances, social competence and alcohol consumption divided in different modules. Every module was conceptualized multi-modal, with illustrations, audio, and video clips which contained psychoeducational information. The results showed a significant reduction of depressive symptoms in the people who underwent the intervention. In another study, an internet-based intervention for tics was conducted on different psychiatric patients, like individuals with attention deficit hyperactivity (ADHD), with obsessive compulsive OCD and individuals with tic disorder (TD) (Rachamim et al., 2021). Also this intervention was divided in modules delivering psychoeducational information and trainings regarding tics, stress management skills and competing responses. The intervention has shown to be effective, with a significant improvement in tic measures found in all groups. Another study was conducted on pain patients with depressive symptoms (Miegel et al., 2019). In this case, the internet-based intervention consisted in different modules, which provided psychoeducation on the development of depression, emotional and physical symptoms, self-concept and social relationships, relaxation techniques, and exercises to strengthen cognitive skills and prevent relapse. Also many of these modules were delivered in video format and the intervention has shown to be effective, with a reduction of depressive and pain symptoms. Furthermore, various meta-analyses have shown the effectiveness of internet-based interventions for people with mental disorders (Guo et al., 2021; Reins et al., 2020; Taylor et al., 2021).

One of the reasons why videos are often used in internet-based interventions for psychiatric patients is to present the content in an appealing way (Bücker, Schnakenberg, et al., 2019; Bücker, Westermann, et al., 2019) and in turn address low adherence and high dropout rates in Internet-based interventions (Melville et al., 2010; Wangberg et al., 2008) As reported in paragraph 2.2, numerous studies have shown that videos can have a positive effect on learning motivation (Bravo et al., 2011; Laksmi et al., 2021; Ledford, 1968; Liao et al., 2019). Thus, presenting psycho-educative information in an appealing way, might increase treatment motivation and decrease dropout rates. In fact, a study that compared an interactive internet-based intervention that included diverse multimedia content (e.g., video, graphics, text) with an identical static internet-based intervention, that only included written text, showed significantly lower dropout rates for the interactive intervention (Linardon et al., 2021). However, there is still the need of more evidence to test these hypotheses.

Chapter 3: Research questions and hypotheses

Two were the research question of this study. Research question 1: “Are videos and texts effective learning instruments?”. Research question 2: “Is there any difference in the effectiveness of videos and texts in psychiatric patients and healthy controls?”.

Overall, 3 hypotheses were formulated. As reported in paragraph 2.2, previous studies reporting the effectiveness of both, video- and text-based learning have shown that both these learning instruments can be effective. Therefore, regarding research question 1, it was hypothesized that videos and texts will be an effective learning instrument in both groups, with a significant increase of knowledge and confidence scores of the overall sample (Hypothesis 1).

Up until now, research on healthy controls has shown contrasting results regarding the investigation of videos or texts being a more effective learning instrument. There are studies in favor of texts being more effective (Furnham & Gunter, 1987; Walma Van Der Molen & Van Der Voort, 2000) and studies in favor of videos being more effective (Chi et al., 2014; Lim et al., 2020; Merkt et al., 2011; Schuelper et al., 2019). As reported in paragraph 2.2, in the studies in favor of texts being more effective than videos, the videos were presented in broadcast mode, in which it is not possible for the viewer to control the video’s flow of information. In the present study, it was made sure that participants can pause and rewind the videos. This way, participants could re-watch part of the video if they wanted, just as they can re-read part of a text. Considering this aspect, we hypothesized that healthy controls will show significantly higher increase in knowledge and confidence scores when they learn from a video compared to when they learn from a text (Hypothesis 2). Up until know, there are no studies in literature investigating how

psychiatric patients learn from videos and from texts. Thus, there is no reason to assume that it will be different from the learning process of healthy controls. Therefore, we hypnotize that, as healthy controls, psychiatric patients will learn better from videos than from texts, showing significantly higher knowledge and confidence scores when they learn from a video compared to when they learn from a text (Hypothesis 3).

Chapter 4: Methods

4.1 Aim of the study

The aim of the present study is to investigate the effectiveness of video-based compared to text-based learning in individuals with mental disorders and healthy participants.

4.2 Design

To examine if videos or texts are a more effective learning instrument, two videos and two texts were created. Each text was the transcription of the audio of the video, so that the same knowledge was presented to the viewer/reader. One video and one text were about “sleep disorders” and the other video and text were about “social competence”. The experimental conditions were the following:

• Group 1: sleep disorders video vs. social competence text; (balance)

• Group 2: sleep disorders text vs. social competence video; (balance)

• Group 3: sleep disorders video vs. social competence video; (balance)

• Group 4: sleep disorders text vs. social competence text; (balance)

To be able to exclude any order effect in the results, every group was balanced for the presentation order of the content of the videos and texts. The control group watched a video that contained information about a smartphone application called COGITO. The study was entirely web-based and participants received access to the survey through a link posted on Facebook groups and flyers that contained a QR code distributed in different psychiatric awards.

At the end of the study, every subject received access to the COGITO app and a mindfulness manual as compensation. These contain exercises that people with and

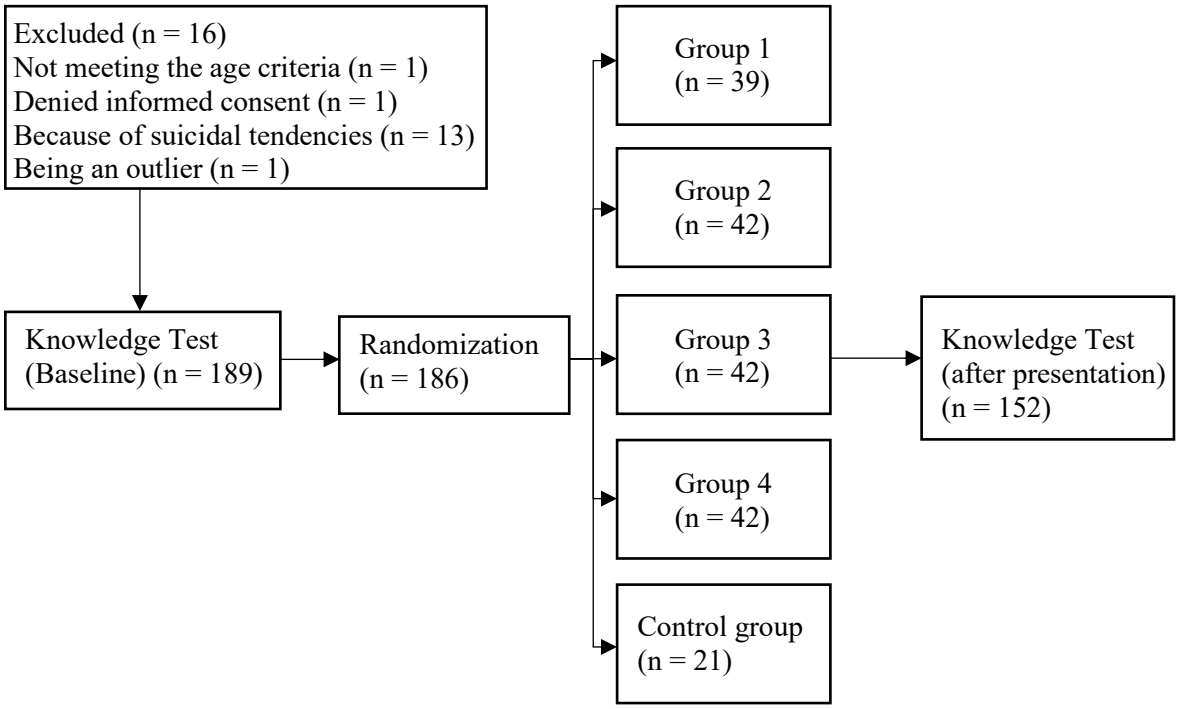
without mental disorders can do, to increase their psychological wellbeing. Both, the COGITO app and the Manual, were developed by the neuropsychological research group of the University Clinic Hamburg-Eppendorf.

The study was approved by the local psychological ethics committee of the Center for Psychosocial Medicine of the University Medical Clinic Hamburg-Eppendorf, Germany (approval number: LPEK-0399) and followed the Declaration of Helsinki Ethical Principles for Medical Research Involving Human Subjects.

4.3 Participants

Every individual between 18 and 75 years old, that had an internet connection, was a German native speaker and had not suicidal tendencies could participate to this study. To evaluate if a participant had suicidal tendencies, the Web Screening Questionnaire was used (Q15 $\geq$ 2). A total of 376 participants participated to this study. In total, 16 participants had to be excluded from the analyses (Figure 1). Since there has been little research on this topic, an a priori sample size estimate was not possible. Considering that this study has a 2x2 factorial design, we decided to recruit approximately 30 individuals for each group.

Figure 1: CONSORT diagram.



4.4 Materials

Using the software "Videoscribe" two whiteboard animation videos were created:

sleep disorders video. The "sleep disorder" video contained general information about sleep disorders, including what factors could generate a sleep disorder and what factors could contribute to its permanence even when the generating factor is not present anymore. Furthermore, the video explains the most common consequences of sleep deprivation The length of the video was 2 minutes and 14 seconds. The resolution was 1080 (Full HD) and 15 fps.

social competence video. This "social competence" video contained general information about social competence explaining how social abilities play a major role in its development and which are other factors that its influenced by. In addition to

"Videoscribe" the software "Final Cut Pro X" was used. The length of the video was 3 minutes and 57 seconds with a resolution of 1080 (Full HD) and 24 fps.

Both videos contained simple whiteboard animation drawings (e.g. characters, schemas or other illustrations), written text, and audios. The audio of the videos was created by a professional voice actor. Both videos were originally developed as psychoeducational instruments in online-interventions for people with mental disorders.

The two texts were the transcription of the audio of the two videos. Two minor changes were done in the words contained by the texts compared to those contained in the audio track:

sleep disorders text. In the sleep disorders video at the beginning, it was stated "In this video". This part was changed in the text to "In this text".

social competence text. In the social competence video at the beginning, it was stated "In the following units" because the video was developed for an online-intervention platform and is one part of more units of an intervention. This part was changed to "In the following text".

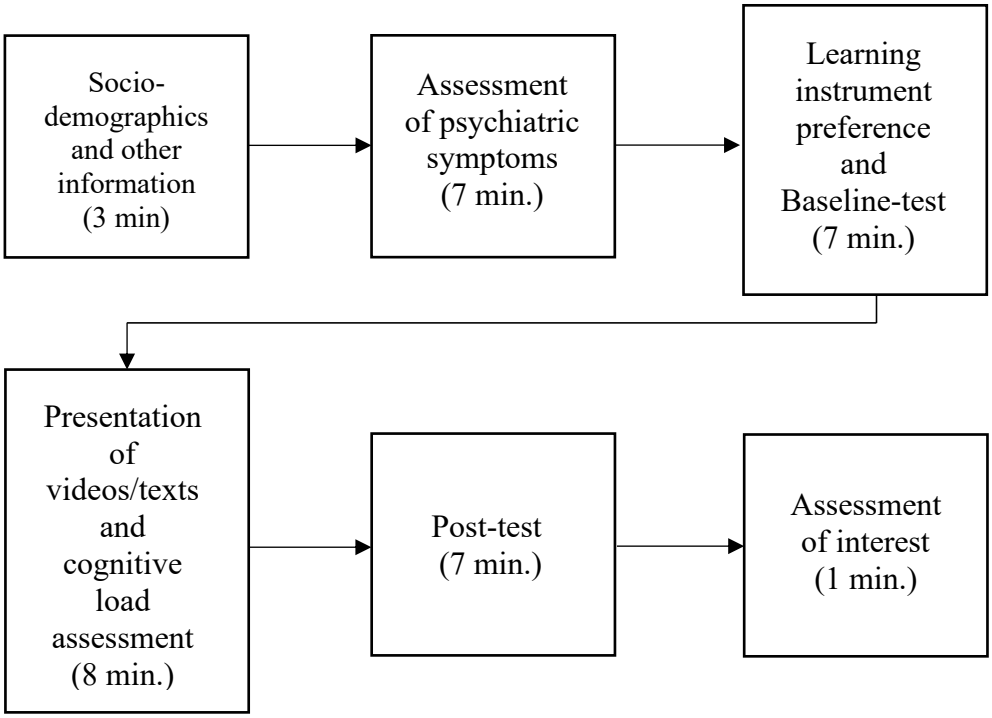
Apart from these two minor changes, the texts contained the exact same words as the audio track. This way, we made sure that the exact same information was presented in the texts as in the videos. All media presented in the study were in German.

4.5 Procedure

Participants were recruited through posts in Facebook groups for people with mental disorders and Facebook groups created specifically to find participants for online-studies. The post contained the link with which participants could access directly to the survey.

Data were collected using the online platform Qualtrics. After providing informed consent, the participants had to respond to questions that collected their socio-demographics (gender, age, education) and other information (psychiatric diagnosis and concentration problems). After that, participants were asked to fill out the two questionnaires which assessed their psychiatric symptoms (WSQ and SCL-27). Then, learning instrument preference was assessed. Following this assessment, participants were asked to complete the knowledge test, which evaluated their knowledge baseline before the presentation of the learning material. At this point, participants were randomly assigned by the Qualtrics survey software to one of the 4 experimental groups (video vs. text, text vs. video, video vs. video, text vs. text) or the control group. The distribution was balanced between all groups (allocation 1:1:1:1). After the presentation of every video and/or text, the intrinsic and extrinsic cognitive load was assessed using the Pass rating scale and the question that asked how complex the topic was for the participant. At this point, participants were asked again to complete the knowledge test. At the end, the respective interest in the two topics (sleep disorders vs. social competence) was assessed. Figure 2 reports the average time needed from the participants to complete the different parts of the survey.

Figure 2: Average time needed for the different parts of the survey



4.6 Measures

Primary outcomes.

***Knowledge acquisition*.** The mean total score of the knowledge test served as the primary outcome. To assess knowledge acquisition the participants completed the same knowledge test before the presentation of videos and/or texts and after the presentation of videos and/or texts. The test consists of 30 multiple-choice questions (true, false), 15 for the topic "sleep disorders" and 15 for the topic "social competence". After each question, participants were asked how sure they were with their answer on a scale from 0-100%. This scale measured difference in confidence before and after watching/reading the videos/texts.

Secondary outcomes.

Cognitive load. Research suggests that it is preferable to measure mental effort after each task instead of a single measure at the end of a series of tasks (van Gog et al., 2012). Hence, cognitive load was administered directly after the presentation of the video/text.

Extrinsic cognitive load. Extrinsic cognitive load was measured with the one item 9-point rating scale on the subjective invested mental effort developed by Paas (Paas, 1992). This scale is widely used in multimedia learning research to assess cognitive load (Chen et al., 2021; Hefter & Berthold, 2020; Le et al., 2018).

Intrinsic cognitive load. Intrinsic cognitive load was measured by asking participants, on a scale from 1-100, how complex they found the text/video.

Mental disorders. Two measures were used to assess mental disorders.

The Web Screening Questionnaire (WSQ). The WSQ is a 15 item self-report screening instrument for depressive disorder, GAD, panic disorder with or without agoraphobia, social phobia, specific phobia, OCD, PTSD, agoraphobia, suicidality and alcohol abuse or dependence (Donker et al., 2009).

Symptom-Checklist-27 (SCL-27). The (SCL-27) (Hardt et al., 2004) is a short-form of the reliable and widely used Symptom-Checklist-90 (Derogatis & Cleary, 1977). The SCL-27 is a screening instrument for psychiatric symptoms which contains 6 subscales: depressive, dysthymic, vegetative, agoraphobic, sociophobic symptoms and symptoms of mistrust (Hardt et al., 2004). The number of items for each subscale varies between four and six.

Learning instrument preference. Learning instrument preference was assessed through the following multiple-choice questions: "How often do you use videos/texts to learn?" *(always, in most cases, in half of the cases, in rare cases, never)*, "Do you prefer to learn from videos or texts?" *(from a video, from a text, from both the same, depends on the situation)*.

Interest in content. The interest about the content of the video/text was assessed through the question: "Please rate on a scale going from 0 (no interest) to 100 (very strong interest), your interest for the topics sleep disorders and social competence". Participants were also asked if they are affected by sleep disorders and how high, on a scale from 0-100, they would rate their social competence, as these aspects could also play a role in the rate of their interest.

4.7 Statistical Analyses

Data were analyzed using IBM SPSS Statistics 28. A repeated measures ANOVA for the dependent variables knowledge and confidence was performed. Time (baseline and post) served as within subject variable and topic (sleep disorders first vs. social competence first), first displayed learning instrument (video vs. text), second displayed learning instrument (video vs. text) and group (psychiatric patients vs. healthy controls) served as between-subjects variables. As group allocation was not randomized, group differences (psychiatric patients vs. healthy controls) for sociodemographic variables (gender, age, education) and variables that could have an effect on knowledge and confidence scores (learning instrument preference, interest for the topic, cognitive load) were tested by means of *t*-tests for continuous variables and chi-square-tests for nominal variables. To

control for group differences between psychiatric patients and healthy controls, analyses were conducted again by means of repeated measures ANCOVAs for knowledge and confidence. Effect sizes were calculated using $\eta^2_{partial}$, whereby $\eta^2_{partial} \approx 0.01$ denotes a small, $\eta^2_{partial} \approx 0.06$ denotes a moderate and $\eta^2_{partial} \approx 0.14$ denotes a large effect size (Kinnear & Gray, 2009).

Chapter 5: Data analysis and results

5.1 Group allocation

To evaluate if a participant was assigned to the healthy controls or psychiatric patients' group, we used the Web Screening Questionnaire (WSQ). Because of the low specificity of this instrument (specificity 0.44 to 0.80; Donker et al., 2009), only participants, who fulfilled screening criteria for at least two diagnoses of the WSQ, were assigned to the psychiatric patients group. Participants who fulfilled screening criteria for less than two diagnoses were categorized as healthy controls.

5.2 Participants characteristics

Demographics, WSQ scores, as well as knowledge and confidence scores of healthy controls and psychiatric patients at baseline are presented in Table 1. Because there were 6 cells with less than 5 observations violating criteria for conducting a chi-square-tests, education was grouped in higher (university graduation, high school graduation) and lower (secondary school and vocational diploma). According to the SCL-27, 54 psychiatric patients and 22 healthy controls showed scores above the cut-off for depressive symptoms; 65 psychiatric patients and 34 healthy controls showed scores above the cut-off for dysthymia symptoms; 41 psychiatric patients and 15 healthy controls showed scores above the cut-off for vegetative symptoms; 21 psychiatric patients and 1 healthy controls showed scores above the cut-off for agoraphobic symptoms; 52 psychiatric patients and 23 healthy controls showed scores above the cut-off for social phobia symptoms; 50 psychiatric patients and 21 healthy controls showed scores above

the cut-off for mistrust symptoms. Significant differences between psychiatric patients and healthy controls were found for all symptom categories (all p<.001).

Table 1

Group differences in sociodemographic characteristics, WSQ scores as well as knowledge test scores at baseline. Means and standard deviations (in brackets) or absolute numbers and percentages (in brackets).

Variable	Full sample (N = 152)	Healthy controls (n = 83)	Psychiatric patients (n = 69)	Statistics
Sociodemographic variables				
Age in years	33.68 (12.59)	32.34 (12.65)	35.68 (12.36)	$t(150)=-1.64$, $p=.640$
Gender				
Male	39 (25.7%)	27 (32.5%)	12 (17.4%)	$\chi^2(1)=4.5$, $p=.033$
Female	113 (74.3%)	56 (67.5%)	57 (82.6%)	
Education				
Higher	119 (78.3%)	73 (88%)	46 (66.7%)	$\chi^2(1)=10$, $p=.002$
Lower	33 (21.7%)	10 (12%)	23 (33.3%)	
Psychopathology screening (WSQ)				
Depression	19 (6%)	0	19 (6.9%)	$\chi^2(1, N=152)=26.1$, $p<.001$
GAD	39 (12.4%)	6 (15%)	33 (12%)	$\chi^2(1, N=152)=32.6$, $p<.001$
Panic disorder	33 (10.4%)	3 (7,5%)	30 (10.8%)	$\chi^2(1, N=152)=35.2$, $p<.001$
Panic disorder and agoraphobia	9 (2.9%)	0	9 (3.2%)	$\chi^2(1, N=152)=11.5$, $p<.001$
Agoraphobia	13 (4.1%)	0	13 (4.7%)	$\chi^2(1, N=152)=17.1$, $p<.001$
Specific phobia	59 (18.7)	10 (25%)	49 (17.8%)	$\chi^2(1, N=152)=55.2$, $p<.001$
Social phobia	49 (15.5%)	9 (22.5%)	40 (14.5%)	$\chi^2(1, N=152)=38.3$, $p<.001$
PTSD	55 (17.4%)	9 (22.5%)	46 (16.7%)	$\chi^2(1, N=152)=50.8$, $p<.001$

OCD	33 (10.4%)	3 (7.5%)	30 (10.9%)	$\chi^2(1, N=152)=35.2, p<.001$
Alcohol abuse	7 (2.2%)	0	7 (2.5%)	$\chi^2(1, N=152)=8.8, p<.003$
Knowledge Test				
Knowledge	18.62 (2.64)	18.81 (2.85)	18.39 (2.37)	$t(150)=0.97, p=.333$
Confidence	70.75 (12.03)	69.66 (12.24)	72.06 (11.71)	$t(150)=-1.23, p=.778$

Notes. WSQ: Web Screening Questionnaire. GAD: Generalized anxiety disorder. PTSD: Post-traumatic stress disorder. OCD: Obsessive-compulsive disorder.

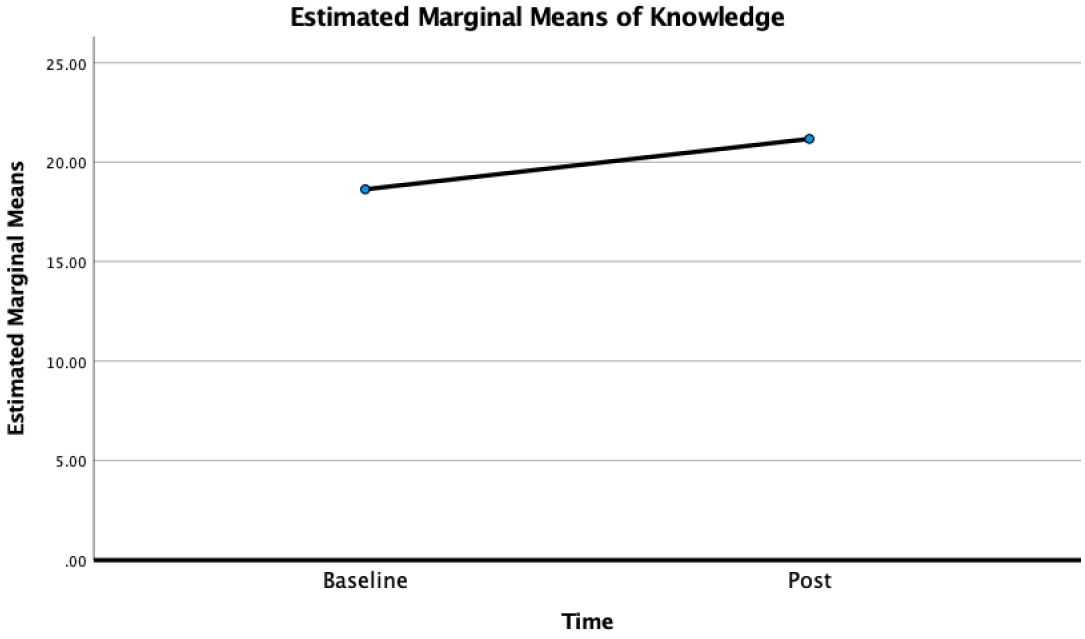
Group comparisons for learning instrument preference, interest for the topic and cognitive load (extraneous and intrinsic load) for the two learning instruments showed following results. Psychiatric patients showed significantly higher intrinsic load for videos (M=44.67, SD=25.71) than healthy controls (M=34.97, SD=20.43), $t(101)=-2.13$, $p=.035$. Psychiatric patients showed significantly higher interest for sleep disturbances (M=72.75, SD=25.72) than healthy controls (M=57.39, SD=26.98), $t(150)=-3.57$, $p<.001$. All remaining comparisons were not significant (all p>.05).

5.3 Repeated measures ANOVA

Exploratory data analyses revealed that the dependent variables (knowledge and confidence) were not normally distributed for some levels of the independent variables (topic, first displayed learning instrument, second displayed learning instrument and group; Shapiro-Wilk test: $p<.05$). However, there is evidence in the literature that ANOVA is robust to a violation of the normal distribution (Blanca et al., 2017; Harwell et al., 1992; Lix et al., 1996; Schmider et al., 2010), which is why we proceeded with the analyses. One participant was excluded from further analysis due to extreme values. The standard assumptions for sphericity were met for all analyses.

Repeated measures ANOVA with knowledge as dependent variable showed a significant increase of knowledge score from baseline to post-test with a large effect size $F(1, 131)=80.07$, $p<.001$, $\eta^2_{partial} = 0.38$. Figure 3 shows the estimated marginal means of the baseline- and post-scores.

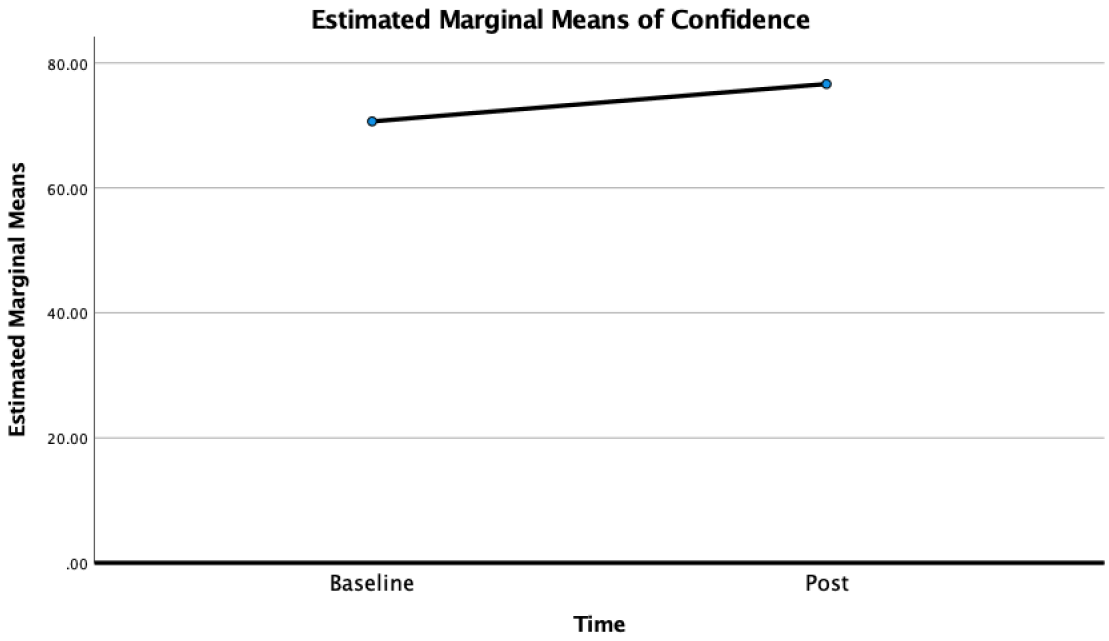
Figure 3: Changes in knowledge from baseline to post test.



No significant effects of first displayed learning instrument (video vs. text), second displayed learning instrument (video vs. text), topic (sleep disorder first vs. social competence first) or group (healthy controls vs. psychiatric patients) were found (all $p>.1$). No significant increase of knowledge score from baseline to post-test was found for the control group ($p=.730$).

A repeated measures ANOVA with confidence as dependent variable showed a significant increase of confidence from baseline to post-test with a large effect size $F(1, 131)=55.34$, $p<.001$, $\eta^2_{partial} = 0.3$. Figure 4 shows the estimated marginal means of the baseline- and post-confidence scores.

Figure 4: Changes in confidence from baseline to post test



No significant effects of first displayed learning instrument (video vs. text), second displayed learning instrument (video vs. text), topic (sleep disorder first vs. social competence first) or group (healthy controls vs. psychiatric patients) were found (all $p>.6$). No significant increase of confidence from baseline to post-test was found for the control group ($p=.518$).

5.4 Repeated measures ANCOVA

Healthy controls and psychiatric patients significantly differed regarding gender $\chi^2(1)=4.5$, $p=.033$, education $\chi^2(1)=10$, $p=.002$, interest for sleep disturbances $t(150)=-3.57$, $p<.001$, and intrinsic load for videos $t(101)=-2.13$, $p=.035$ (see chapter 5.2). When gender, education, interest for sleep disturbances and intrinsic load for videos were included into the analysis as covariates, no significant increase of knowledge score from baseline to post-test was found $F(1, 94)=1.94$, $p=.167$. Again, no significant effects of

first displayed learning instrument (video vs. text), second displayed learning instrument (video vs. text), topic (sleep disorder first vs. social competence first) or group (healthy controls vs. psychiatric patients) were found (all $p>.4$).

Also for confidence, the inclusion of gender, education, interest for sleep disturbances and intrinsic load for video into the analyses as covariates resulted in no significant increase of confidence from baseline to post-test $F(1, 94)=0.17$, $p=.682$. No significant effects of first displayed learning instrument (video vs. text), second displayed learning instrument (video vs. text), topic (sleep disorder first vs. social competence first) or group (healthy controls vs. psychiatric patients) were found (all $p>.2$).

Chapter 6: Discussion

The present study investigated if videos and texts are equally effective learning instruments and whether they differ in their effectiveness in psychiatric patients compared to healthy controls. In a first analysis, both groups showed a significant increase of knowledge and confidence scores from baseline to post-test with no significant differences between the two learning instruments. These findings suggest that videos and texts are equally effective learning instruments for both healthy controls and psychiatric patients. However, groups differed on the baseline variables gender, education, intrinsic load for video, and interest for sleep disturbances. To control if these group differences had an impact on the learning outcome, a repeated measures ANCOVA with these variables as covariates was conducted. These analyses did not confirm the previous results showing no significant increase of knowledge and confidence scores from baseline to post-test. In the following, the findings of the present study are discussed with regard to the hypotheses formulated in chapter 3.

The first hypothesis (Hypothesis 1) was concerned with the effectiveness of the videos and texts as learning instruments in both groups stating that both learning instruments are expected to be effective. In a first stage, the analyses confirmed this hypothesis. However, when the results were corrected for those variables which showed group differences the findings were not confirmed. Thus, the results do not completely support the first hypothesis. Particularly, videos and texts may be an effective learning instrument, however, other variables like gender, education, cognitive load and interest for the topic that the individual learns, may impact their effectiveness.

Up until now, the studies that compared video-based learning with text-based learning in healthy controls showed contrasting results. Some of them were in favor of texts being more effective (Furnham & Gunter, 1987; Walma Van Der Molen & Van Der Voort, 2000) some in favor of videos (Chi et al., 2014; Lim et al., 2020; Merkt et al., 2011; Schuelper et al., 2019). A relevant factor explaining these contrasting results may be whether videos were presented in broadcast mode or not. The studies that found texts to be more effective often used broadcast mode in video presentation, which does not give participants the possibility to control the flow of information. Since participants had this option in the present study, it was hypothesized that both healthy controls (Hypothesis 2) and psychiatric patients (Hypothesis 3) will learn better from videos than from texts. The findings of the present study do not support these two hypotheses. In fact, videos and texts have been found to be equally effective in both groups at a first analysis but further analyses controlling for relevant group differences did not confirm these results. In particular, psychiatric patients showed higher interest for the topic sleep disturbances, higher intrinsic load by videos and lower education than healthy controls. Furthermore, the psychiatric patient's group was constituted of significantly more females than the healthy controls group. First, the higher interest for psychiatric patients in sleep disturbances seems plausible, given the matter that there is a lot of evidence showing that these individuals often experience disturbed sleep (Cohrs, 2008; Franzen & Buysse, 2008; Freeman et al., 2020). Therefore, they were most likely more interested in this topic because it was personally relevant for them. Second, our findings suggest that psychiatric patients are more sensitive to cognitive load elicited by videos than healthy controls. In fact, previous studies did not found differences between cognitive load elicited by videos and texts in healthy individuals (Hefter & Berthold, 2020; Hoogerheide et al., 2014;

Kramer et al., 2020). Also this is supported by previous literature, as studies have shown that individuals with psychiatric disorders can show cognitive deficits (Etkin et al., 2013; Liu et al., 2021; Millan et al., 2012; Tripathi et al., 2018). Although the range of cognitive problems between psychiatric patients can be diverse, the cognitive domains which mainly appear to be affected are executive functions, attention and information processing, as well as working memory (Trivedi, 2006). Given the involvement of the working memory in multimedia learning (Mayer, 2005) and the matter that anything that consumes the capacity of the working memory is defined cognitive load (Sweller, 1988), it appears plausible that individuals who experience deficits in this domain also experience higher cognitive load.

In summary, our results suggest that there are no differences in the effectiveness of video-based compared to text-based learning in psychiatric patients as well as healthy controls. However, as we did not find evidence for the effectiveness of both video- and text-based learning when including covariates into the analyses, future research should investigate whether the type of learning instrument is decisive or whether other factors such as interest for the topic and cognitive load may be more relevant for learning outcomes.

6.1 Implications

Even if the findings were not completely in line with the hypotheses, they have several implications. First, they suggest that videos and texts can be an equally effective learning instruments for both psychiatric patients and healthy controls. This is especially relevant considering that videos are often used as psychoeducational instruments in internet-based interventions for psychiatric patients to present the content in an appealing way (Bücker, Schnakenberg, et al., 2019; Bücker, Westermann, et al., 2019) and to address low

adherence and high dropout rates (Melville et al., 2010; Wangberg et al., 2008). In fact, previous studies report that videos can have a positive effect on learning motivation (Bravo et al., 2011; Laksmi et al., 2021; Ledford, 1968; Liao et al., 2019) and lower dropout rates (Linardon et al., 2021). However, up until now, no studies investigated the effectiveness of video-based learning in psychiatric patients compared to text-based learning.

While the findings of the present study supported the use of both videos and texts as learning instruments in internet-based interventions for psychiatric patients, they also showed that these individuals are more sensitive to the cognitive load elicited by videos. Therefore, they suggest that these videos should be produced, limiting cognitive load as much as possible, especially intrinsic load. Mayer proposed different techniques to reduce intrinsic processing. These are the following: describe names and characteristics of key elements of the lesson before showing multimedia material, use spoken text rather than printed text and use words and pictures rather than words alone. Although there is no data that supports the effectiveness of these techniques, they have a theoretical foundation and could be used in future studies.

In summary, the findings support the use of both videos and texts as psychoeducational instruments in internet-based interventions for psychiatric patients. However, videos should be designed in a way that they elicit as little cognitive load as possible.

6.2 Limitations and future studies

To the best of our knowledge, this is the first study that compared the effectiveness of text-based and video-based learning between psychiatric patients and healthy controls. While the findings brought new and important information to the literature, there are some

limitations that we address in the following. First, the present findings should be replicated with education and gender distributed homogeneously in psychiatric patients and healthy controls. Especially education may have impacted the learning outcome of participants. Future studies should match clinical and healthy participants regarding relevant sociodemographic characteristics. Second, to assess changes over time in knowledge, a quantitative multiple-choice measure was chosen to provide objective scoring and accommodate research time. However, a qualitative evaluation could be considered a broader assessment gathering more detailed information. At the same time, a disadvantage of a qualitative assessment is the fact that it is more difficult to score and analyze objectively. Therefore, future research on this topic could include both, quantitative and qualitative assessments. Furthermore, we found that the average baseline score of the multiple-choice test was 18 out of 30, suggesting that a harder test was viable. Third, on an important note, we used a repeated measures ANCOVA to control for group differences between healthy controls and psychiatric patients. However, one of the assumptions of the repeated measures ANCOVA is that the covariates are distributed homogeneously between the groups that are analyzed. Therefore, this aspect may reduce the validity of the results of the analyses. Future studies could use alternative analyses, like mediation analyses.

Forth, to evaluate if a participant was categorized as healthy control or psychiatric patient, we used the WSQ. The problem of screening questionnaires overestimating clinical symptoms has been often reported in literature (Andrews et al., 2006; Thombs et al., 2018). For this reason, we choose to assign participants to the psychiatric patient's group only if they fulfilled screening criteria for at least two diagnoses of the WSQ. Participants who fulfilled screening criteria for less than two diagnoses were categorized as healthy

controls. Therefore, our findings need to be replicated in a sample of healthy individuals and psychiatric patients with validated diagnoses, for example by means of structured clinical interviews or expert ratings. Furthermore, future research should also consider other important clinical information, like the onset of the disorders and the pharmacological and psychological treatment, that could also have an impact on the learning outcome of the patients. Finally, future studies could examine if there are any differences in video-based learning, text-based learning, and in elicited cognitive load between different psychiatric diagnoses.

6.3 Conclusions

Overall, these findings suggest that videos and texts can be equally effective learning instruments. However, because the results were not confirmed when it was controlled for group differences, more research is needed on this topic to draw stronger conclusions. Patients seem to be more sensitive to the cognitive load elicited by videos, suggesting that one should structure videos that are aimed to be used with these individuals, so that cognitive load is minimized. Psychiatric patients also showed to be more interested in sleep disturbances than healthy controls suggesting that a more neutral topic should be chosen when video-based and text-based learning in psychiatric patients and healthy controls is studied. Furthermore, our findings need to replicated in future studies using matched samples and assessing validated psychiatric diagnoses.

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Appendix

Image sleep disturbances video

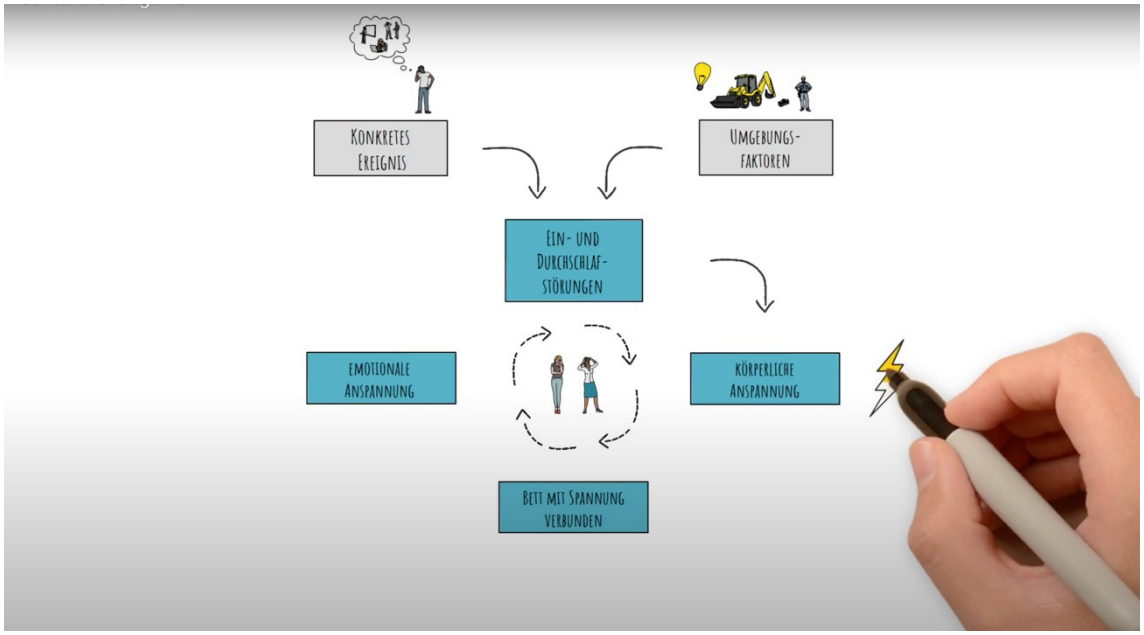
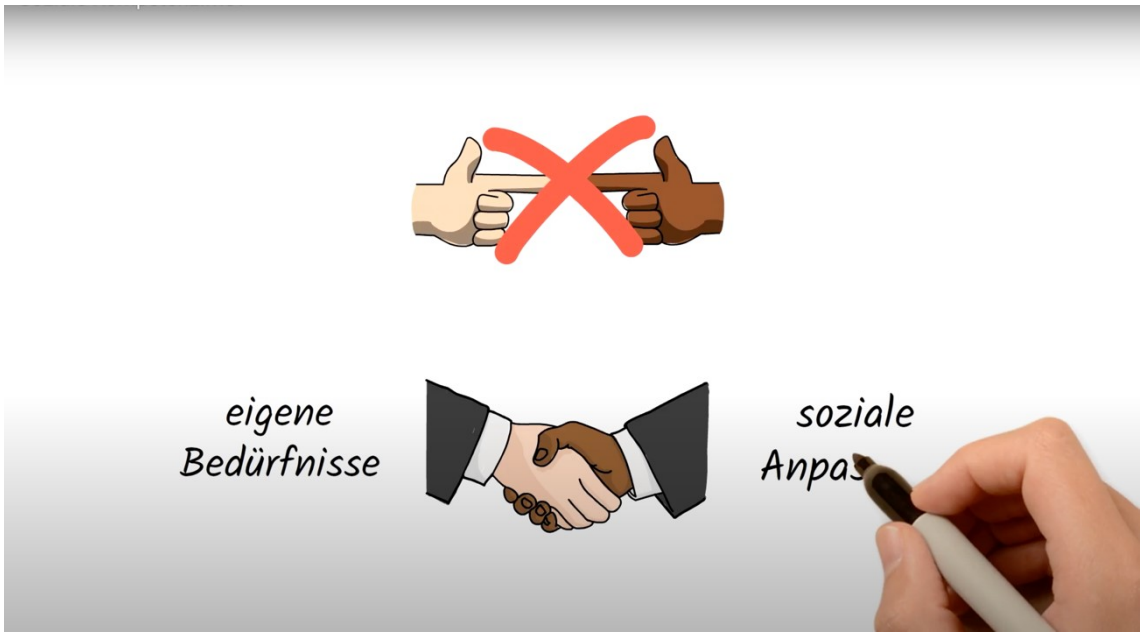


Image social competence video



Original knowledge test (German)

Item 11: Personen mit guten sozialen Fähigkeiten können diese auch immer einsetzen.

o Richtig

o **Falsch**

Item 14: Die Bildung einer Person beeinflusst die Entwicklung der sozialen Kompetenz.

o Richtig

o **Falsch**

Item 2: Die soziale Kompetenz wird von folgenden Faktoren beeinflusst: den sozialen Fähigkeiten, der Persönlichkeit und der Stimmung.

o Richtig

o **Falsch**

Item 6: Zu lernen, seine eigenen Interessen gegenüber Anderen unterzuordnen, zeugt von einer hohen sozialen Kompetenz.

o **Richtig**

o Falsch

Item 13: Einzelkinder haben oft eine niedrigere soziale Kompetenz.

o Richtig

o **Falsch**

Item 30: Vollmond ist ein wichtiger Umgebungsfaktor, der dazu beitragen kann eine Schlafstörung auszulösen.

o Richtig

o **Falsch**

Item 4: Zu lernen, seine eigenen Interessen gegenüber Anderen durchzusetzen, zeugt von einer hohen sozialen Kompetenz.

o **Richtig**

o Falsch

Item 19: Ein helles Zimmer kann zu Ein- und Durchschlafstörungen führen.

o **Richtig**

o Falsch

Item 7: Zur sozialen Kompetenz gehört auch die Fähigkeit, um Sympathie zu werben.

o **Richtig**

o Falsch

Item 17: Muskelschmerzen zählen zu den häufigsten Folgen von Schlafmangel.

o Richtig

o **Falsch**

Item 5: Seine eigenen Interessen den Interessen Anderer unterzuordnen, bedeutet, eine niedrige soziale Kompetenz zu haben.

o Richtig

o **Falsch**

Item 21: Um eine Schlafstörung behandeln zu können, muss zunächst der Auslöser identifiziert und beseitigt werden.

o Richtig

o **Falsch**

Item 16: Morgens zu spät aufzustehen, ist bei vielen Menschen der Auslöser von Schlafstörungen.

o Richtig

o **Falsch**

Item 1: Die Fähigkeit die Körpersprache einer Person zu lesen ist ein wichtiger Bestandteil der sozialen Kompetenz.

o Richtig

o **Falsch**

Item 28: Schlafmedikamente sind der effektivste Weg, eine Schlafstörung zu behandeln.

o Richtig

o **Falsch**

Item 26: Nach einer Nacht mit wenig Schlaf sollte man in den nächsten Nächten besonders lange schlafen, um den Schlafmangel auszugleichen.

o Richtig

o **Falsch**

Item 12: Eine Person mit einer hohen sozialen Kompetenz fühlt sich in jeder Situation wohl.

o Richtig

o **Falsch**

Item 18: Augenreizungen zählen zu den häufigsten Folgen von Schlafmangel.

o Richtig

o **Falsch**

Item 10: Die drei wichtigsten Faktoren der sozialen Kompetenz sind: die sozialen Fähigkeiten, das Überwinden von Blockaden und die eigenen Normen und Werte.

o **Richtig**

o Falsch

Item 24: Gereizte Stimmung tritt als Folge von Schlafmangel, aber auch als Folge von zu viel Schlaf auf.

o **Richtig**

o Falsch

Item 27: Mittagsschlaf kann helfen, eine Schlafstörung zu verbessern.

o Richtig

o **Falsch**

Item 22: Im Großteil der Fälle ist eine organische (körperliche) Ursache der Auslöser für eine Schlafstörung.

o Richtig

o **Falsch**

Item 25: Der Schlaf vor Mitternacht ist erholsamer, als der in den Stunden danach.

o Richtig

o **Falsch**

Item 3: Soziale Kompetenz wird definiert als die Fähigkeit, eine nette und freundliche Einstellung zu haben.

o Richtig

o **Falsch**

Item 8: Die soziale Kompetenz ist abhängig von den persönlichen Normen und Werten.

o **Richtig**

o Falsch

Item 29: Es gibt Techniken, die man lernen kann um seinen Schlaf zu verbessern, sie sind aber oft nicht wirksam.

o Richtig

o **Falsch**

Item 20: Rückenschmerzen zählen zu den häufigsten Folgen von Schlafmangel.

o Richtig

o **Falsch**

Item 23: Eine Schlafstörung wird durch den Zusammenhang verschiedener Faktoren aufrecht erhalten.

o **Richtig**

o Falsch

Item 9: Eine positive Beziehungsgestaltung bedeutet, seine eigenen Bedürfnisse den Bedürfnissen Anderer immer unterzuordnen.

o Richtig

o **Falsch**

Item 15: Menschen, die wenig Freunde haben, haben eine niedrige soziale Kompetenz.

o Richtig

o **Falsch**

Translated knowledge test (English)

Item 11: People with a high social competence can always deploy it.

o True

o **False**

Item 14: The education of a person influences the development of her social competence.

o True

o **False**

Item 2: The social competence is influenced by following factors: the social abilities, the personality, and the mood.

o True

o **False**

Item 6: Learn to subordinate one's own interests to others, shows a high level of social competence.

o **True**

o False

Item 13: Only children often have a lower social competence.

o True

o **False**

Item 30: A full moon is an important environmental factor that can contribute to trigger a sleep disorder.

o True

o **False**

Item 4: Learn to assert one's own interests over others, shows a high level of social competence.

o **True**

o False

Item 19: A bright room can lead to problems of falling asleep and sleeping through the night.

o **True**

o False

Item 7: Social competence also includes the ability to solicit sympathy.

o **True**

o False

Item 17: Muscle pain is one of the most common consequences of lack of sleep.

o True

o **False**

Item 5: Subordinating one‘s own interests to the interests of others means having low social skills.

o True

o **False**

Item 21: To treat a sleep disorder, you need first to identify and eliminate the trigger.

o True

o **False**

Item 16: Getting up late in the morning is for many people the trigger which develops sleep disorders.

o True

o **False**

Item 1: The ability to read a person’s body language is an important part of the social competence.

o True

o **False**

Item 28: Sleep medication is the most effective way to treat a sleep disorder.

o True

o **False**

Item 26: After a night with little sleep, you should sleep extra-long the next fight nights to compensate for the lack of sleep.

o True

o **False**

Item 12: A person with a high social competence feels comfortable in any situation.

o True

o **False**

Item 18: Eye irritation is one of the most common consequences of lack of sleep.

o True

o **False**

Item 10: The three most important factors of social competence are: social skills, overcoming blockades and one's own norms and values.

o **True**

o False

Item 24: An irritable mood occurs as a result of lack of sleep, but also as a result of sleeping too much.

o **True**

o False

Item 27: Napping can help improve a sleep disorder.

o True

o **False**

Item 22: In most cases, an organic (physical) cause is the trigger for a sleep disorder.

o True

o **False**

Item 25: Sleep before midnight is more restful, than sleep in after midnight.

o True

o **False**

Item 3: Social competence is defined as the ability to have a nice and friendly attitude.

o True

o **False**

Item 8: Social competence depends on personal norms and values.

o **True**

o False

Item 29: There are techniques you can learn to improve your sleep, but they are often not effective.

o True

o **False**

Item 20: Backpain is one of the most common consequences of lack of sleep.

o True

o **False**

Item 23: A sleep disorder is maintained by the connection of various factors.

o **True**

o False

Item 9: In a healthy relationship, you tend to subordinate your own needs to the needs of others.

o True

o **False**

Item 15: People who have few friends, have low social competence.

o True

o **False**