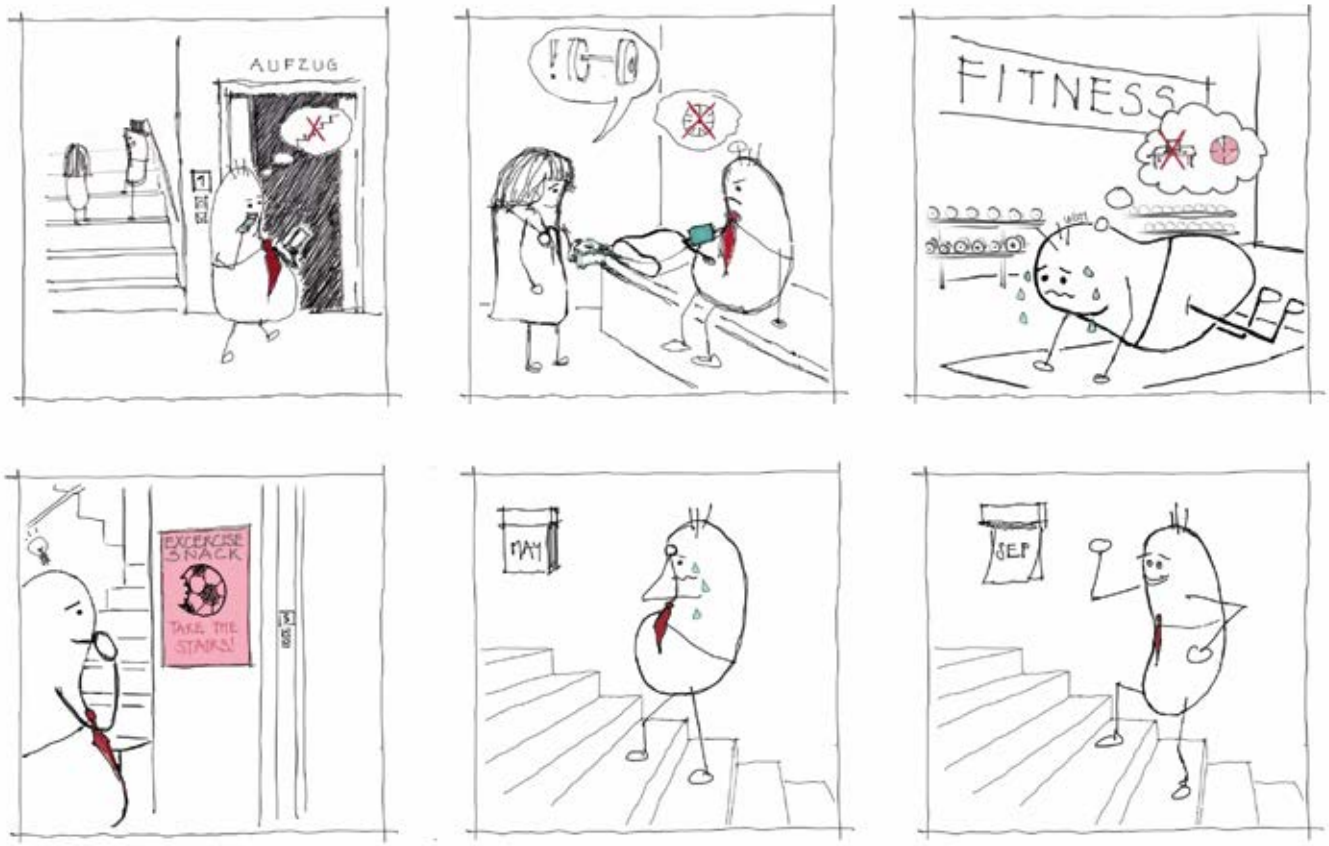
AUFZUG
FITNESS
EXERCISE SNACK
TAKE THE STAIRS!

Project Report **Lacktivity**

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Preface by the Supervisors

Prof. Dr. Bertold Hock and Prof. Dr. Volker Nürnberg

The TUM: Junge Akademie has undergone major changes over the past ten years, especially when it comes to the interactions between mentors and scholarship holders. They gradually shifted from a top-down relationship to a guided self-organization. In other words, the scholarship holders now independently form groups and define their own program under the roof of a general topic given by the Advisory Board. The role of supervisors is now seen in the light of cooperation and partnership.

The team with the acronym “Lacktivity” got together during the Kick-Off year 2020 from November 22–24 at Schloss Aspenstein (Georg-von-Vollmar-Akademie) at Kochel above the scenic lake Kochel. The seven student members together with their supervisor are shown in Fig. 1. The background of the members included a wide range of interests, among them Engineering, Education, Mathematics and Architecture.

I have seen my role as a supervisor in the Lacktivity group never in the sense of an overseer or watchdog, as the word suggests in its German meaning. The brilliant performance of the group, its creativity and prudence never made this necessary. It was a great pleasure to join the group as a mentor, answer questions where I was asked, or suggest methods. I suspect the bigger advantage was on my side. Therefore, I would like to thank all members of the group for their perseverance and patience. These qualities were important prerequisites for the success of the project in difficult times. It is a mark of quality that the group never gave up under the restrictions of the pandemic. Rather, they found an intelligent alternative to their original experimental concept. With it, they achieved their goal of suggesting methods to overcome the lack of physical activity. I wish all members good luck and a bright future.

Bertold Hock

Fig. 1. The Lacktivity group with its supervisors

The Scholarship holders of the TUM: Junge Akademie have chosen a very exciting and relevant project with the title “Lacktivity.” Due to an increasingly sedentary society, there is more and more lack of exercise and activity, which in turn can lead to lifestyle diseases such as diabetes or high blood pressure. To increase the physical activity of employees, the group analyzed that stair climbing instead of taking a lift would be well suited. This is an appropriate and above all low-threshold approach to reach employees more effectively. The students showed a high level of motivation even though some challenges arose due to the pandemic. It is understandable that the approach could not be experimentally proven because it was not possible due to Covid-19. Nevertheless, the results and findings of the Lacktivity project provide a foundation for further research in the field of nudging.

Overall, it was exciting to accompany the project, as I am involved in health promotion both privately and professionally and struggle with the 10,000 steps myself every day. I wish all TUMJA scholarship holders all the best for their future and continued success!

Volker Nürnberg ■

Stairs instead of chairs – because your health cares

It is a typical day of work. You just received an urgent note from your boss to step by for a short meeting. So you get up from your desk and walk out to the stairwell as your destination lies two floors higher. And then you see both the inviting comfort of the elevator and the promise of better health contradicted by additional physical effort in the form of the stairs.

You take a look at the clock and see you only have a minute left. "The elevator will surely be faster," you tell yourself while standing in front of the closed metal doors, waiting for them to open.

Think about it, when was the last time that you could have taken the stairs but instead decided to take the elevator? Did a few steps into a healthier life feel like too much of a burden? Did you fear that you would be out of breath by the time you got to your destination and your co-workers would laugh about your fitness?

Fear not, you are not alone. In practice, only few regularly manage to reach the 10.000 steps per day target set by the World Health Organization (WHO). This is the baseline to maintain good health and greatly reduce the risk of many diseases.

This was the main motivation for our team, fittingly called "Lacktivity", to think about how the current situation can be changed. Our motto: We don't want to force you to do anything. As students, we know that as soon as you have to do something, motivation drops to previously unknown levels of low. Consequently, we were looking for a new approach to make physical activity great again. There are huge bodies of research, but one of the latest and greatest techniques is called "Nudging." With Nudging, instead of prohibiting certain activities or directly encouraging them by saying things like "Take the stairs. Do it now!", people are, rather, influenced to think about a topic and come up with measures they see fit on their own. This inverts their motivation from coming from external sources to coming from their intrinsic will.

If you think about it, this makes total sense. Being told to do the dishes is unlikely to get you to do the dishes right now. But what if a friend instead asks you to grab a drink with them later while he adds that there is nothing more annoying than having to do the dishes after coming home after a long night out? As you likely feel the same way, you are more inclined to clean them now instead of afterwards. This example is obviously drawn out of thin air, but it still depicts the basic idea of nudging pretty well.

Now who exactly is "you"? It is very important to set a specified target group in order to be able to better tailor our methods. For example, motivating people in a start-up who regularly run marathons to take the stairs seems a bit pointless. Thus, we tried to sample different companies from a broad spectrum in order to achieve a target group with an average to rather low level of regular physical activity.

After deciding on our strategy to get people moving, we still needed to find ways to nudge them. After a lot of thinking and talking to industry experts, we came up with very different methods which we wanted to compare based on their effectiveness. On the one hand, a more classical approach, utilizing motivational and deterrent posters, which for example contained contents like "Going to the 6th floor is 1% of the Zugspitze" in the motivational case and "A lack of physical activity increases the risk of cardiovascular diseases. Taking the stairs is a step in the right direction." was chosen.

Aside from posters, we also utilized a more novel method that makes taking the stairs itself a fun activity. In other words, we tried to improve the user experience of taking the stairs by fun facts obtainable at different levels. That way, instead of just getting to your destination, you also end up learning new things along the way. Such facts are for example that Humanity still needs to dive to the bottom of the ocean to acquire metal from sunken ships from the pre-World War II era in order to build Geiger counters for radiation detection.

Lastly, competition was brought into the game. This was done by comparing the absolute amount of stairs taken between different companies and showing them on companies' big information screens. This way, participants would always see the score of their competitors first thing in the morning and start their day off in a stair-taking manner.

I am sure some of you have asked yourselves how such activities are going to be measured during experiments. And no, even our time as students is too precious to sit in front of a stairway the whole day and count the number of people going up and down. We initially planned to use commercially available light barriers, but were shocked once we found out that the amount we needed would have cost us a fortune. So, back to the drawing board we went. Kind of not knowing what we were getting ourselves into, we decided to just build the sensors we needed from scratch. This meant designing the circuits, ordering them from a manufacturer, assembling them into presentable boxes all while being careful not to make the stairways, which normally have a pretty cold and business-like appearance, look like a laser maze. The sensors were a great success and we were able to dramatically cut down the cost per sensor by building them ourselves. Excited about our progress, we were eager to visit companies and collect data for our experiments.

But then, disaster hit. The original as well as the second time frame in which we had planned to install our sensors at our partner companies' staircases was affected by lockdown restrictions. As it was still unclear at the time of the second deferral if or when on-site projects could be possible again, we decided to test our nudging strategies by conducting an extensive survey.

So, the challenge was then to translate our planned methodology into the purely digital format of a survey as well as possible. We tried to mimic the decision process that would normally happen right at the decision point, the choice of way in front of either the elevator or the stairs. Right there, one of our methods is implemented by a poster or, in the case of competition, by a counter of the stairs taken by the other team.

Then, the participants are asked to rank our different methods depending on which they think would be most effective in order to lure them away from the escalator in favor of the stairs. Furthermore, for each method there are different variants of posters listed that can again be ranked. Additionally, we asked them for their reasoning for why they chose a certain method in order to gain a holistic view about the effectiveness of different implementations.

Fortunately, the last hurdle for successful surveys, finding enough participants, was overcome with the help of our partner companies, who agreed to take part in the survey.

So, we received over 200 responses. Aside from some chronically-lazy participants, an overwhelming majority gave very positive feedback and would appreciate the implementation of our methods in their companies. As one participant fittingly said, "Having motivational posters would often help me to overcome my weaker self and not give in to being lazy and taking the elevator." This was a common occurrence that came up countless times during analysis of the responses and shows that oftentimes, a single nudge is all it takes to live a healthier life. Our deductions from the survey will now be presented in more detail in the following scientific part. ■

lacktivity

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Abstract

Introduction: People hardly meet the recommendations for physical activity in their daily working routines. Sedentary behavior is particularly high and previous interventions trying to increase physical activity have often failed.

Objectives: Therefore, we examine which of the methods (motivation, deterrence, user experience, competition) can most successfully increase the spontaneous physical activity of employees with regard to their stair usage.

Methods: In order to determine which method is most suitable, scenarios were described in a survey in which employees had to decide whether to use the stairs or the elevator. Subsequently, the Situational Motivation Scale (SIMS) was used to capture the specific motivation for taking the stairs.

Results: Our findings strongly indicate that motivational posters are the most effective method. The SIMS reveals that there are dependencies between the chosen method and all types of motivation besides amotivation.

Conclusion: Positive effects of motivational posters in daily working routines regarding climbing stairs were identified. This paper provides a foundation for further research in the field of nudging in occupational health management and the practical implementation of motivational posters in companies.

Background

Hardly any adults meet the WHO recommendations of 10.000 steps per day. These recommendations are designed to encourage an appropriate amount of physical activity on a daily basis and are intended to maintain and promote health benefits (World Health Organization, 2008). Recent studies confirm that the sedentary time of Europeans in everyday working life is currently too high at over 4.5 hours per day and has continued to rise in recent years (López-Valenciano et al., 2020). Physical inactivity represents a major health risk, especially when it occurs over a long period of time, for example, during the workday. Interventions to counteract this trend have so far been rather insufficient, which is also shown by a consideration of occupational health management (OHM). A

lack of an overarching occupational health management concept and sustainability, as well as a lack of responsibilities, are most frequently criticized (Arps et al., 2019). Those interventions seem to be less efficient since they often suffer from the effects of variation, caused by lack of access and support from management. Furthermore, the difficulty of passing from knowledge to action is often a problem (Rouat et al., 2021).

Consequently, it is necessary to find an approach to motivate employees to be more physically active in their daily work routine without applying costly OHM concepts and sports courses in their free time. There are several OHM interventions that can help improve the health of employees and make their working routine fitter. For instance, OHM interventions can encourage employees to take the stairs (Titze et al., 2001). Stair climbing is particularly suitable because it can be accumulated during the workday and still make a significant contribution to the recommendation of 30 minutes of daily physical activity. This can be perfectly integrated into the workday, as it does not require additional equipment or encroach upon valuable free time. Previous studies have also shown the effect of climbing stairs during working hours, citing significant decreases in body fat percentage through regular stair climbing (Fardy & Ilmarinen, 1975). The amount of energy burned by stair climbing is approximately 8-11kcal per minute, which is quite high compared to other moderate physical activity (Duke Human Resources, 2021). Therefore, it would take only 5 minutes of stair climbing to burn the calories of an apple. In summary, a weight reduction of up to 3 kg per year can be achieved by only climbing 2 floors per day. Encouraging employees to take the stairs more often during the workday can achieve and maintain a healthy body weight, healthy bones, muscles and joints. The methodological approach to encourage people to climb stairs has so far been relatively one-sided in research and has therefore only rarely been able to demonstrate significant benefits. For both stair climbing and other OHM health interventions, experts use a variety of methods to encourage increased physical activity. These are presented in the following.

Figure 1: Methods for increasing physical activity and stair usage.

Motivation

Motivation refers to all motives and reasons for acting or behaving in a particular way, which can be stimulated both internally and externally. In the context of health interventions and stair climbing, motivational posters or installations are considered to motivate people to climb stairs externally and to cause internal motivation for lifestyle changes to get healthier.

Previous research shows motivational stair-raiser banners with slogans such as "Stay healthy, use the stairs" or "Be active!" placed at an appropriate location show positive effects on increasing use of stairs (Kerr et al., 2001a). However, not only motivational banners but also posters in large sizes motivate people to take the stairs more often. Studies in shopping malls and at train stations showed that motivational posters larger than DINA3 with slogans such as "Stay healthy, save time, use the stairs!" significantly motivate people to climb stairs more often according to their gender (Kerr et al., 2001b). The decision to take the stairs at the workplace is a spontaneous one. According to current research results, at the point of decision between elevator and stairs, interrogative slogans on the posters prove to be more effective in motivating people to climb stairs than imperative slogans (Suri et al., 2014). We can thus conclude that the visibility, format or size of the posters and the linguistic design of the messages are of great importance in successfully motivating employees to climb stairs more often.

Deterrence

Deterrence refers to an action of discouraging a behavior or event through instilling doubt or fear of the consequences. Regarding stair climbing in everyday working life, for example, negative health consequences of taking the elevator may be illustrated. These consequences serve as a deterrent and cause employees to decide to climb the stairs more often. In this context, the Protection Motivation Theory, attempts to explain health-promoting behavior on the basis of coping mechanisms and fear (Rogers & Mewborn, 1976). Study

results show that 35% of behavioral intentions of the Canadian population and 20% of their actual behavior is precisely influenced by the state of fear and its coping mechanisms (Plotnikoff et al., 2009). Further findings by Russel and Hutchinson (2000) demonstrated in general that the use of signs, either deterrent or motivational, significantly increased the use of stairs. Using deterrent signs at the point of decision with slogans such as "Keep your heart healthy" and "Please limit escalator use to people who are unable to use the stairs" increased stair use by 6.67% regardless of age and gender (Russell & Hutchinson, 2000). Deterrent posters are therefore suitable for encouraging employees to take the stairs more often, as fear of negative health consequences triggers coping mechanisms.

User Experience

User experience refers to the situational context in which a user interacts with a product, system, or service. In this context it is about the perception of the situation with the aim of making the interaction as pleasant and positive as possible. When it comes to motivating people to climb stairs more frequently, aspects that improve the experience within the stair climbing situation are the most effective. Improved user experience can be achieved by using different media. Study results show that the use of gamification methods with mobile fitness apps or email notifications that encourage taking the stairs is most likely to motivate employees to increase their amount of stair climbing and physical activity in general (Andersen et al., 2013; Spillers & Asimakopoulos, 2014). Referring back to the previously mentioned internal and external motivation, we can state that gamification replaces internal motivation with external incentives. Most gamification implementations use a score-based system with rewards to keep up engagement (Zuckerman & Gal-Oz, 2014). Therefore, the user has to be kept in a cycle of continuous reward in order to guarantee lasting change. In order to motivate employees to increase their use of stairs through improved user experience, continuous incentives are necessary. These can be implemented methodically, for example, through fun facts during stair climbing, digitally as a push notification, or analogically in the form of a poster.

Competition

Competition refers to the activity or condition of striving to gain or win something by defeating or establishing superiority over others. When it comes to sports, there is a distinct culture of competition, which can also be applied to such activities as taking the stairs. The competition between colleagues or between two companies can lead to the fact that one changes its behavior in a way that one would like to climb more stairs than the opposing party. Competitions regarding the daily number of steps taken, represented by social comparison of pedometers and scores on websites, encourage people to increase the number of steps taken by 10% compared to non-competitive conditions (Johannesson et al., 2010). Further research examines the effect on regular participation in sports courses. Social comparison was more effective for increasing physical activity than social support and its effects did not depend on individual or team incentives (Zhang et al., 2016). In addition to successful competition, social support and group membership also play an important role in motivating people to be more physically active. Study results on team-based weight loss approaches show that a high social influence of team members can positively affect the weight loss of the whole group. Additionally, it can promote increased physical activity, which can be applied to taking the stairs more often (Leahey et al., 2012). Therefore, to encourage employees to take the stairs, a mixture of competitive but also team-oriented measures is necessary. Colleagues could compete as a team against other companies in stair climbing and see the score of the leading company live on screens in or in front of the stairwells.

Nudging

As we have already seen, there are various theoretical approaches that can motivate employees to take the stairs and hence exercise more in their daily work routine. One underlying approach is nudging. It describes a subtle and gentle method of influencing people's behavior in a predictable way. Nudging maintains the impression of self-directed behavior and contributes to motivate employees to take the stairs more often (Thaler & Sunstein, 2008). Nudging can decrease sedentary behavior in the workday and increase physical activity through certain walking concepts. There was a study in which employees were subtly encouraged to exercise more by walking directly to their colleagues instead of making redundant calls or sending emails (Gilson et al., 2009). In general, nudging is a popular approach for promoting physical activity in the workplace, including stair climbing. Results from Meiden et al. show that salient nudges such as footprints on the floor had greater success (91.4%) than just posters with motivational slogans such as "Free workouts during work hours? Take the stairs!" (46.3%) to encourage employees to take the stairs more often (Meiden et al., 2019).

Goals and Methods

Goals

To address the previously outlined problem concerning the lack of physical activity in everyday life, we want to analyze promising methods to solve this problem. The scenario of climbing stairs, which has also been described above, is particularly suitable for promoting daily number of steps and physical activity. Instead of looking at methods individually as it has been done in research before, we wanted to look at the overall concept within a comparison of methods.

Therefore, we addressed the following research question in our study: Which of the methods (motivation, deterrence, user experience, competition) can most successfully increase the spontaneous physical activity of employees with regard to stair usage (RQ)? Additionally, we wanted to investigate the dependency between the frequency of taking the stairs and the relation to socio-demographic data such as age, sex, level of education and status of employment. We hypothesized that especially younger and educated people in part-time and full-time employment are most likely to take the stairs, regardless of gender (H1).

Furthermore, we wanted to investigate whether there is a dependency between the frequency of stair use and self-assessment in relation to one's own overall health and physical fitness. We hypothesized that especially employees with a (very) good grade in the categories of overall health and physical fitness are also more likely to take the stairs (H2).

The research question posed, and its associated hypotheses allow for a detailed discussion of methodological approaches regarding incentives to motivate employees to take the stairs more often. Our aim is to provide a valuable methodological contribution, not only as a theoretical basis but also as a scientifically based OHM implementation for future interventions in targeted companies.

Methods and Participants

To assess employees' attitudes toward taking the stairs in their daily work, we conducted a survey. In the period from April to May 2021, employed (187 full-time, 64 part-time, 14 other) adults (n = 265; 74 male, 191 female; mean age = 39.76 years ± 11.74 (SD), range = 18−-70) in various German- and English-speaking companies of different sizes and economic orientations were questioned. When asked how frequently they currently take the stairs during their workday on a 5-point Likert scale (1 always, 5 never), the mean was 1.75 ± 0.85 (SD) with a range of 1–5 (M: mean = 1.57 ± 0.68, range = 1 – 3; F: mean = 1.82 ± 0.9, range = 1–5). The participants were informed about the use of their data and agreed to the processing of the data for scientific analysis but could voluntarily and independently discontinue the survey at any time. In addition, the participants were informed that there is no right or wrong when it comes to measuring motivational aspects and that they should therefore answer based only on their initial reaction.

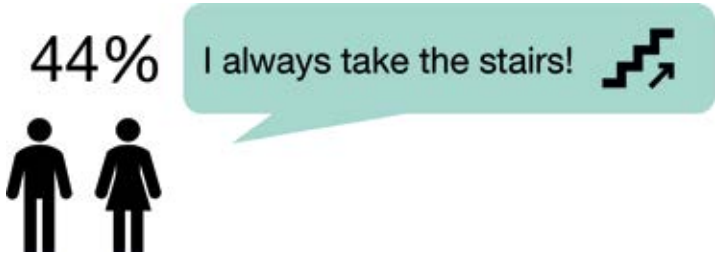

Figure 2: Percentage of people always taking the stairs at work.

Instruments

Our survey captures employees' attitudes in a hypothetical scenario from their everyday working lives, in which they must choose between taking the elevator or the stairs to go upstairs. The use of vignettes as a methodological tool allows us to elicit and capture the subjective sense of action through imagined situations (Barter & Renold, 1999). We used the vignette as a stimulus in our survey, where the respondent is asked to assess the situation and to indicate a course of action appropriate to the situation and to justify it. We then define the respective methods of the scenario and ask respondents to rank them. The order of rank determines which page of the survey will be shown next. The page contains exemplary representations for posters or installations of the method previously selected at position 1 in the ranking. Here the participant was asked to once again rank those 4 posters according to their preferences. All posters were created by the research team, taking into account the aspects of posters for health interventions (visibility, size, nudging, etc.) mentioned above.

Figure 3: Scenario setup between elevator and stairs.

Next, the Situational Motivation Scale (SIMS) was used to assess the motivation to take the stairs, after choosing the most appropriate individual example of the previously selected method (Guay et al., 2000). This scale is widely used to measure motivation for physical exercise. The instrument measured intrinsic motivation (i.e. 'Because I think that this activity is interesting'), identified regulation (i.e. 'Because I am doing it for my own good'), external regulation (i.e. 'Because I am supposed to do it'), and amotivation (i.e. 'There may be good reasons to do this activity, but personally I don't see any'). Each one of these subscales contained four items. Every item was rated on a five-point Likert scale from one (agree) to five (disagree).

There was another part of the survey that was intended to inquire about the feasibility of implementing the methods in the company. These free-text answers were not further qualitatively evaluated within the scope of this study, but rather served as incentives and possible cooperation opportunities for the implementation of the actual methodological TUM: Junge Akademie project.

In the next section of the survey, we collected the participants' socio-demographic data. This includes gender, age, highest level of education, and current employment situation. In order to assess the level of physical activity at work, we also asked about the conditions under which employees get to their workplace (motorized or through their own activity, such as cycling or walking) and how often they use the elevator or stairs during their workday. A five-point Likert scale was used to indicate frequency (always, often, occasionally, rarely, never). In addition, self-assessment of one's own overall health and physical fitness was conducted using school grades. This self-assessment tool is frequently used in school sports and is therefore valid (Otero-Saborido et al., 2021). In fact, research shows that results of self-assessment strategies can reflect descriptive portraits regarding one's own health and a positive self-perception and more realistic self-assessment.

Interpretation

First, all descriptive data from all variables in the survey were analyzed. Distributions as well as probabilities of the data were determined using R. Then, the SIMS as well as the demographic data was analyzed with Fisher's exact test in R due to the small sample size and nominal data. For data with low sample sizes, the R fisher test with monte carlo simulation ($B=10^5$) was used.

Results and Discussion

Reliability of Measure

Internal Consistency of the SIMS data was chronbach's alpha = 0.8 (IM), 0.85 (IR), 0.76 (ER), 0.88 (AM) where all values pass the 0.7 threshold suggested by Nunally, 1978.

Ranking Results

In the described scenario, the motivational poster was most often (158) chosen as rank 1, followed by UX (54) while Deterrence was chosen the least often (17). This allows us to reject the H_0 hypothesis $p_M \leq 0.5$ with a p-value of 0.001, where p_M denotes the likelihood of motivational posters being chosen for rank 1.

	Motivation		User Experience		Competition		Deterrence	
Rank 1	158	(0.6)	54	(0.2)	36	(0.14)	17	(0.06)
Rank 2	59	(0.22)	106	(0.4)	54	(0.2)	46	(0.17)
Rank 3	41	(0.15)	60	(0.23)	109	(0.41)	55	(0.21)
Rank 4	7	(0.03)	45	(0.17)	66	(0.25)	147	(0.55)
Avg. Rank	1.61		2.36		2.77		3.25	

Table 1: Results of the method ranking.

Note: Rows 1-4 show the number of participants who chose the method in the corresponding rank with the percentage in regard to all participants in parenthesis. Row 5 shows the average weighted rank of the method.

Figure 4: Rank 1 poster from each category or method.

Other Results

The data does not suggest a dependency between sex / age / education and stair usage. The exact fisher test rejects the independence of the self-assessed overall health and physical fitness with stair usage with a p-value of 0.004 and 0.001 respectively. The dependency could be described as weakly positively correlated (Health: 0.14, Fitness: 0.2) if the Likert and grade results are interpreted on a numerical scale as it can be seen in Table 2.

	1 very good	2	3	4	5	6 insufficient
Health	1.67	1.7	1.98	2	2.5	–
Fitness	1.43	1.73	1.78	2.04	2.27	1.75

Table 2: Average Likert scale result for stair usage depending on the self-assessed over health and fitness in school grades.

Note: (Health n=(1: 78, 2: 128, 3: 45, 4: 8, 5: 2);
Fitness n=(1: 40, 2: 102, 3: 79, 4: 25, 5: 11, 6: 4))

Lastly, intrinsic motivation ($p=0.004$), identified regulation ($p<0.001$) and external motivation ($p=0.041$) can be assumed to depend on the choice of the preferred method. There were however no significant ($p<0.05$) signs that the same holds for amotivation.

Discussion

First of all, it has to be mentioned that our results are not based on measurements but rather on a survey. This implies the common limitation when it comes to self-assessment. Furthermore, the majority (72%) of our participants were female. However most results were similar when separated between genders.

The results can however answer our research question with an extraordinary high significance in favour of motivational posters. Not only were we able to derive that motivational posters are the most picked method for rank 1. We were even able to show that more than 50% prefer motivational posters, which implies our hypothesis and answers our research question. Furthermore, the dependency between method and SIMS was expected. Due to the sample size we were however not able to describe the dependency with more details without applying more complex procedures. We might be able to analyze the dependency with a factor analysis for the final report.

While we were not able to supply sufficient evidence for (H1), this phenomenon has already been well documented in recent studies (Akkermans et al., 2009; Akkermans et al., 2013).

On the other hand our expectations were correct for (H2) as the results show. The dependency between self-assessed health and fitness correlate with the participants' stair usage. This trend can even be seen with bare eyes in Table 2. There it has to be noted that the sample size for the health grade 5 and fitness grade 6 (n=2 and 4) are very low, hence they should be ignored. This result implies that by targeting elevator-taking employees the hardest to reach group of self-assessed unhealthy employees can be reached.

Overall we were surprised by the big lead of motivational posters. Here it would be interesting to validate our survey results with measured data in order to erase the self-assessment component.

Summary and Future Goals

In conclusion, motivational posters have the greatest effect in motivating employees to casually engage in taking the stairs during the workday more often and thereby increase the amount of physical activity in everyday working routines, compared to the other methods. The results of the survey further showed that targeting stair usage is a good way to reach otherwise hard-to-reach target groups.

However, several methodological limitations can be identified in the present research design, namely that the assessment of motivation was exclusively captured by the described vignettes and the survey. A measurement of the streams of movement in stairwells on site in companies, before, during and after the methods were installed could have increased the validity and reliability here. Furthermore, the representativeness of the respondents for the total population is difficult to estimate, as the acquisition of survey participants was problematic despite extensive efforts and therefore no further sample restrictions and adjustments could be made.

Nevertheless, these research results provide an important contribution to current research. We were able to close gaps regarding the comparison of methods, as we applied the Situational Motivation Scale to all methods and not exclusively to the subjectively best method. Furthermore, this paper provides a suitable approach for further research in the field of motivational posters in occupational health management. Based on our scientific findings, incentives can be created to motivate employees to exercise more in their workday by motivating them to take the stairs more often.

Further research should deal with specific exemplary implementation of the motivating methods and posters. A concept consisting of three intervention studies (pre-intervention, during intervention, long term post-intervention) could be suitable for this purpose, in which the flow of movement is measured in the stairwell, in front of elevators and in front of stairs. This will help to determine whether employees are actually more motivated by the method installed in the stairwell and therefore prefer the stairs significantly more often than the elevator. Further research should also be conducted in the field of nudging in OHM. Our study has shown that especially unobtrusively placed interventions that subtly encourage people to take the stairs have great success. Perhaps this should be an incentive for OHM research to focus on unconscious incentives and nudging and less on classical OHM sports courses, which often fail due to a lack of competent personnel and funding. It also remains to be clarified whether it makes sense to consider and apply methods on their own or to design and evaluate a holistic approach with all the methods mentioned. This approach could help to address the health needs of employees who spend a lot of time sitting and have little free time for physical activity. ■

Lacktivity

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Self-reflection

Our process started at the first seminar weekend in Kochel am See in November 2019, when we first came together as a team of eight students with various study backgrounds. Among these were Human Factors Engineering, Education, Health Sciences and Social Studies, Management & Technology, Mathematics, Architecture, Computational Mechanics and Environmental Engineering. We knew from the beginning that we wanted to work on a theme that had a social focus, particularly on the health and fitness of society. Even though there are already many possibilities and much information on how to exercise and stay healthy, studies show that most people still lack physical activity. After a few meetings, research, and brainstorming, we found that the reason for this is a lack of time, or at least a perceived lack of time. Therefore, we wanted to do a project that would encourage people to incorporate physical activity "sportaneously" into the day of and thereby improving their fitness incidentally.

To figure out the exact implementation, we divided up the topics we thought would be relevant and interesting to do research on. As we were a relatively large group, we came up with a lot of information that had to be sorted. Whenever we arrived at such points, our tutors have been of great help by giving advice on how to move on. Narrowing down the information we had, we figured that the occasions within a workday between sitting at desks, could be an interesting time within which to incorporate more physical activity. Motivating the employees to take the stairs instead of the elevator seemed to us to be the most sensible way to implement exercise into their daily routine. But what is the best method to do so? To find the answer to this research question, we planned on testing different methods for their feasibility. We came up with four main methodologies, these being: Motivation, Deterrence, Competition and User Experience. As splitting the topics within our team proved productive before, we did so once again. In the following period, we found it most effective to work in smaller teams and to check in as a whole group every once in a while, to update and also help each other with the progress.

It was always helpful that we had a lot of different study backgrounds, as we always had different perspectives on the discussed themes. This was also the case when we were looking for a way to measure which method leads employees to take the stairs most often compared to the elevator. With our different knowledge backgrounds, we believed we could prepare a good way to do so using light barriers. Simultaneously, we established contact with many companies. Some were interested and we were able to build up some connections.

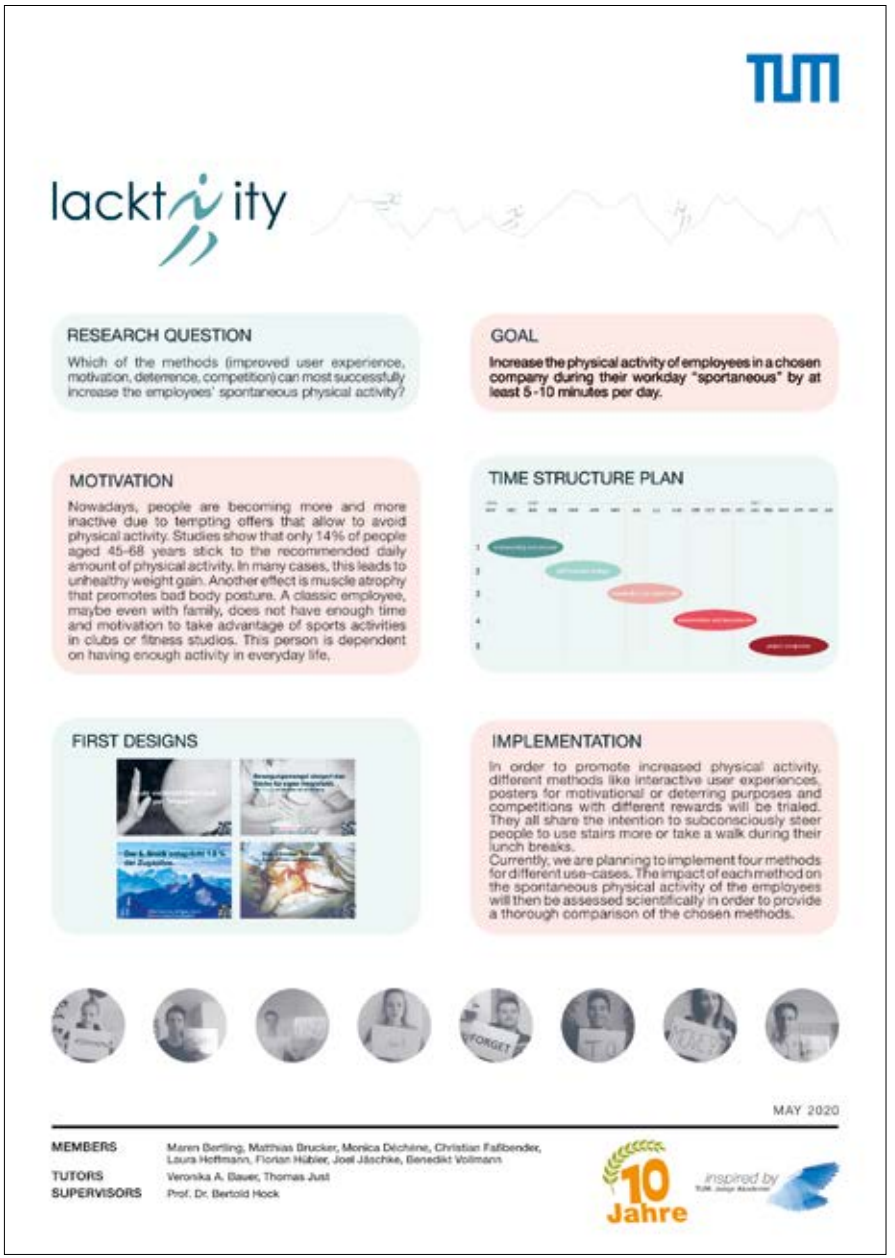
Unfortunately, a few months into 2020, Corona came, and so we had to relocate our meetings to online meeting platforms. A pity, as we got along well as a team. But the bigger problem was in fact

that we saw our project drift away. In the beginning we were still optimistic that the situation would improve soon and we could follow our plans for implementation. But as the pandemic kept going on and on, it kept getting more and more unrealistic that we could carry out our project as planned. Our project completely relied on employees being at the office and not in the home office. Due to this, our motivation fell to a low around this point. But with the help of our supervisors and tutors, we managed to get back on track and find a way to keep our main focus but with minimal personal contact. For this reason, we decided to get results by shifting from the real life scenario to conducting a survey. This demanded a lot of flexibility and also creativity of us, but thereby also taught us and prepared us for future projects. Thankfully, some of our initial contacts forwarded our survey to their employees, so we could still get scientific results on the topic.

During our journey at the TUM: Junge Akademie we also had to work around the problem of some people leaving our team and the Junge Akademie during the project period. Even though this was always a surprise at first, it did not hinder us from progressing and instead gave everyone more responsibility and maybe even more motivation to work for our project. Even though our group got smaller and Corona prevented us holding physical meetings, we kept up the team spirit by, for example, creating team Lacktivity t-shirts.

Our supervisors Dr. Bertold Hock and Dr. Volker Nürnberg always helped us when we had any questions and when we needed contacts, for example to distribute our survey. We are very thankful for the conversations and the insights they gave us on their work, the wonderful food and beer in Freising and all the advice!

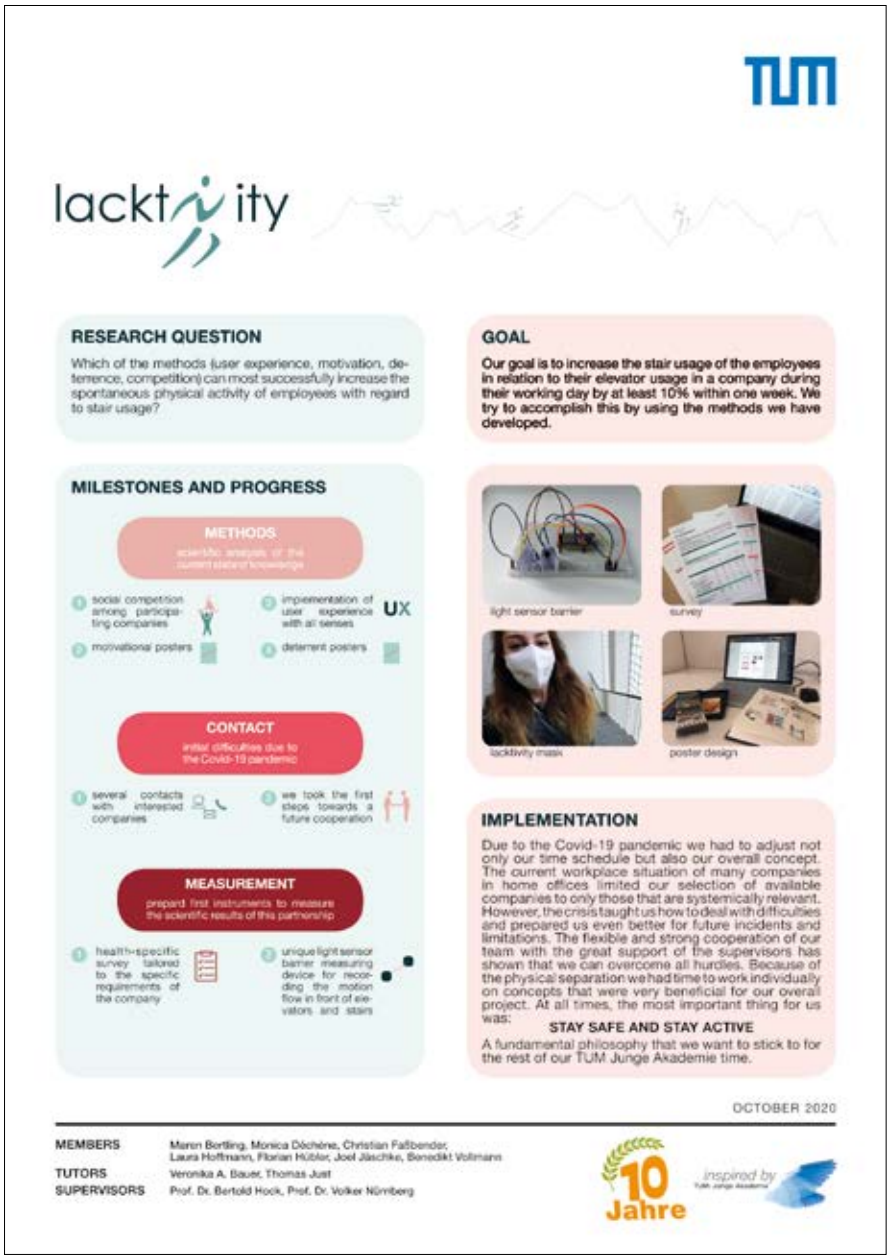
We also want to thank Veronika Bauer and Thomas Just who guided us through the project and gave us the right pushes when we needed them, especially in the beginning! Also a big thank you to the whole team from the TUM: Junge Akademie, especially Peter Finger.



POSTER 1:

Our first contact was at the seminar weekend at Kochel am See. What brought us together, was, besides mutual sympathy, the aim to do good for society. Since we figured the lack of physical activity as one of the biggest health risks in our modern world, we wanted to tackle that exact problem. Despite the fact that there are more than enough opportunities to do sports or exercise in general and, in theory, every citizen knows about the negative impacts of a lack of exercise, people still exercise way too rarely. After great and intensive brainstorming sessions and discussions we identified a lack of time as the main reason for this problem. Consequently, we decided to aim at bringing physical activity into the daily life of employees. As we defined the project goals before the outbreak of the Covid-19 pandemic, we focused on implementing the measures in the buildings of partner companies. In essence, we planned on motivating employees to take the stairs instead of using the elevators.

Afterwards we split responsibilities. One team systematically researched the availability of appropriate partner companies, who had to fulfil several criteria like a certain number of employees and access to elevators. In a second step, those companies were contacted and several meetings were conducted. At the same time, another team was developing methods on how to increase stair usage and how to quantify the results. Our overarching scientific goal was to find out which method is the most suitable to increase stair usage and thus motivate employees to integrate physical activity into their everyday life. ■



POSTER 2:

At the time of the second poster, we had already made a lot of progress. The four different methods had been defined, scientifically based and also already developed. Furthermore, laser barriers to quantify the stair usage had been built and several companies were willing to let us conduct the experiment at their facilities. Unfortunately, as for most of the teams, the Covid-19 pandemic destroyed most of the hard work. For over one year, only systemically essential employees were allowed to go into the office – the rest were working from home offices. As our original plan was to conduct the study at the office facilities and we figured that was now going to be difficult, we started to implement a backup plan to be more flexible in the event of further disturbances to the pandemic.

For the backup plan, we kept our scientific goal to find the most suitable method to motivate employees to use the stairs. Instead of focusing on real-life stair usage at the location, we decided to get the answers by directly asking the target group which kind of method they would prefer or in other words which kind of method would motivate them the most to use the stairs instead of the elevator.

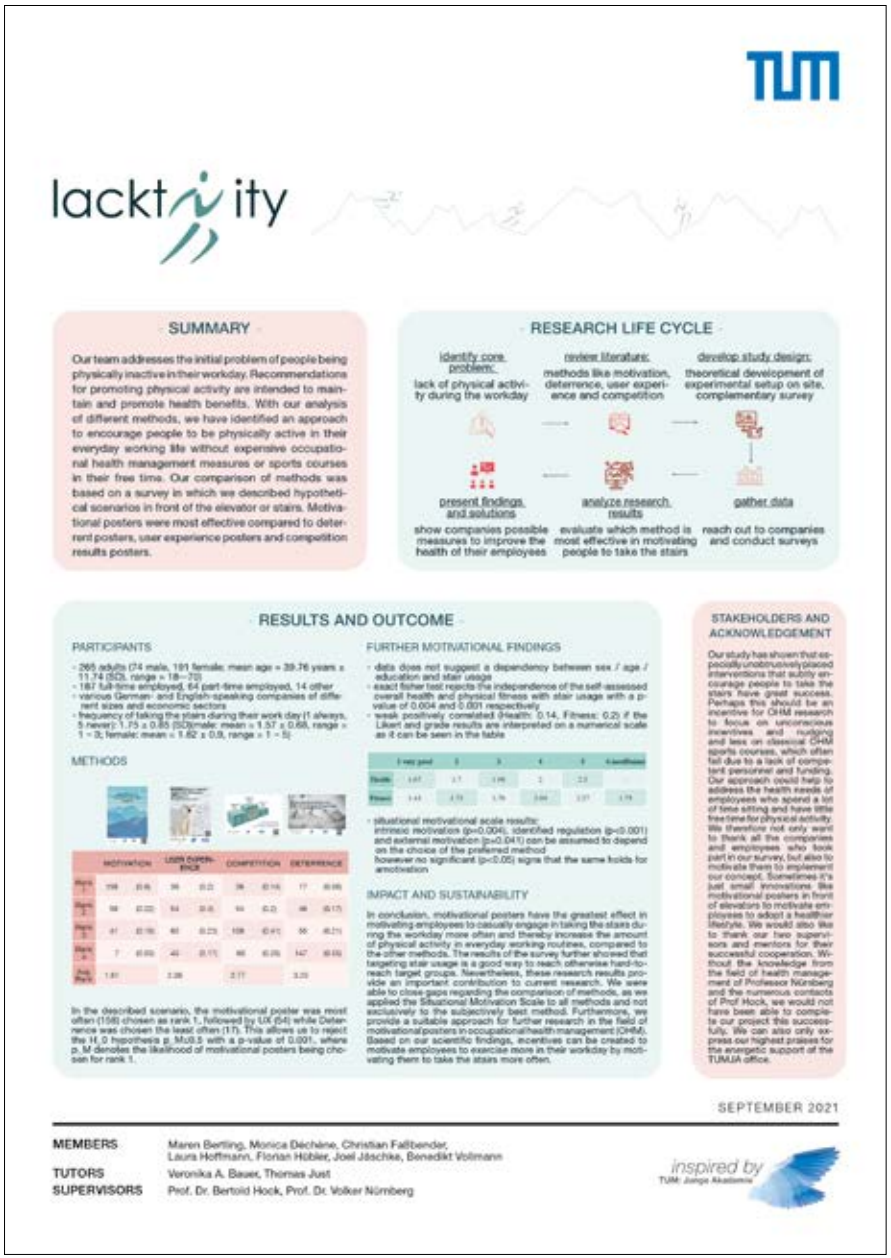
All in all, the Covid-19 crisis was a big challenge for us as a team. However, we learned to stand together as a unit, be more flexible and to be prepared for all further challenges. ■

POSTER 3:

As the Covid-19 situation did not improve at all and most employees were still working from home we had to throw away our first plan and switched to the backup plan. Luckily, the contacts we had gained initially for the conduct of the experiment came in handy as we could cooperate with them also for the backup plan and our flexibility was rewarded.

Therefore, to answer our research question, we developed an extensive survey which was based on previous literature and our developed methods. The survey was created both in German as well as English, to also account for non-German speaking participants. It was finally distributed via EvaSys to all different partner companies. In the meantime, we carried on our already conducted research to provide the scientific background to the methods we compared in the survey, and we started working on our research paper.

As we could only meet in online Zoom sessions, we designed our own shirts to keep up the team spirit and show our commitment to the project. ■



POSTER 4:

Poster 4 describes the work that has been done to finalize our research and evaluate the results. After sending out the survey, we contacted as many additional potential participants as possible to get statistically relevant results. As soon as we had reached a satisfying number of participants, we started evaluating the survey and analyzing the most motivating method. As a final step, we want to distribute our work and help companies to increase the health of their employees by motivating them to exercise in the right way.

In conclusion, we thank every member of TUMJA for the wonderful time we have had and encourage everyone to keep moving, or in other words: Stay Safe and Stay Active! ■