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## Abstract

Medical treatments in hospitals can be highly stressful for children, potentially affecting their well-being and recovery. Clown interventions have been proposed as an effective non-medical approach to alleviate this stress and improve health outcomes. Here, we employ a randomized controlled trial (RCT) to evaluate the effects of hospital clown visits on pediatric patients in Palestine, an environment characterized by challenges in healthcare access, sociopolitical tensions and conflicts, and limited resources. As outcomes, we consider the children's well-being during the hospital stay, the recovery process, and the caregiver's perception of the quality of the hospitals. The results show that clown visits have a significant, positive effect on the well-being of children during their hospital stay: The children's well-being in the treatment group was by 0.25 standard deviations higher compared to children who did not see a clown during their hospital stay. The positive well-being impacts are particularly strong among children with a higher socio-economic status and those with a positive attitude towards clowns. No effects of clown visits are found on the subjective recovery of patients as measured by caregivers and on the caregiver's perception of the hospitals. The findings underscore the potential of non-medical interventions like clown visits to alleviate the psychological burden of hospitalization for children and to increase their well-being, particularly in vulnerable settings like Palestine.

**Keywords:** Healthcare, clown visits, pediatrics, well-being, randomized controlled trial, Palestine

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## 1. Introduction

Hospital stays can be an intimidating and stressful experience, especially for children (Wollin et al., 2003). This can cause problems on various dimensions. Previous research shows that a high anxiety level among children can negatively affect the success of invasive treatment and correlates with higher numbers of complications in the long term (McCann & Kain, 2001; McGraw & Kendrick, 1998). Furthermore, it can enhance existing challenges such as an overall lack of trust in public hospitals that is found especially in developing countries, leading to low rates of healthcare utilization (Peters & Youssef, 2016). The experiences of children in hospitals, therefore, might play a decisive role in the effectiveness of an existing healthcare system.

In a randomized control trial (RCT) in cooperation with Red Noses International, a non-governmental organization (NGO) for clown visits in hospitals, this project sheds light on the effect of hospital clown visits on pediatric patients in Palestine. By randomizing the schedule of standardized clown visits in hospitals, children are randomly assigned to a control group (no clown visits) and a treatment group (one or more clown visits). As outcomes we consider the effects of clown visits on: (1) the child's well-being during the hospital stay; (2) the recovery process of the pediatric patient; and (3) the caregiver's perception of public hospitals. The information is collected in telephone interviews among children's caregivers. The caregivers can accurately assess outcomes because 96 percent of them were present every day during the hospital stays of their children.

The results demonstrate that hospital clowns have a significant positive impact on children's well-being during their hospital stay. Children who interacted with clowns experienced a 0.25 standard deviation increase in overall well-being compared to those who did not. This indicates that clown visits are effective in enhancing a child's hospital experience and reducing the psychological burden of illness. In a heterogeneity analysis, we find that children from families with a higher socioeconomic status benefit more from the intervention, suggesting a potential socioeconomic disparity in response to clown visits. Also, children with a positive attitude towards clowns experienced a substantially larger well-being improvement, emphasizing the importance of individual attitudes to humor and clowning as a moderating factor. No effects of clown visits are found on the subjective recovery of patients as measured by caregivers and on the caregiver's perception of public hospitals.

The remainder of this paper is structured as follows. Section 2 gives an overview of the existing literature and the theory of change. Section 3 provides more context on the health situation in Palestine and the activities of Red Noses International. Section 4 describes the impact evaluation design and the data. Section 5 and 6 discuss the results, and section 7 concludes.

## 2. Previous literature and theoretical considerations

Clown visits can affect mental and physical health outcomes in various ways as illustrated in Figure 1. Humor and laughter can directly influence various physiological systems of the body creating positive health effects (Martin, 2002). For example, laughter has been shown to enhance the production of pain-reducing endorphins and to lower the production of stress-related hormones contributing to improved respiration, blood circulation, and greater relaxation (Dunbar et al., 2012; Ferner & Aronson, 2013).

Humor and laughter can also influence health outcomes by inducing a positive emotional state and boosting the morale among care receivers, making them more resilient to negative feelings and pain (Kuipera, 2012; Stuber et al., 2009). A positive emotional state can in turn have a cascading effect on the healing process. A study from Australia demonstrated significant impacts of a humor skills program on emotional well-being. Specifically, the program led to increased self-efficacy, positive affect, optimism, and perceptions of control, while decreasing perceived stress, depression, anxiety, and stress levels (Crawford & Caltabiano, 2011).

Clown visits can also have indirect effects on health and well-being. Humor and laughter can moderate the adverse effects of stress on health and allow patients to cope better with stressful experiences. Through distraction, clowns can provide support in stressful situations, such as before and during treatment (Martin, 2002). In these situations, clown interventions have been shown to reduce stress hormone levels in the body, such as cortisol (Ding et al., 2022; Lopes-Júnior et al., 2018). By reducing stress and anxiety, the interventions can contribute to improved immune function, shorter hospital stays, and faster recovery times.

Clowns may also exert a positive health impact through improvements in the health care environment, for example by allowing patients to build trust more easily in medical staff or by improving the general atmosphere and relationships in clinics and hospitals. When children are less anxious and afraid, they are more likely to cooperate with medical staff during treatments and examinations. This cooperation can improve the efficiency of medical procedures and reduce the need for sedation or restraint. In this context, humor can serve to strengthen relationships and cooperation, enabling communication between medical staff and patients, and to ‘humanize’ the healthcare experience (Kinsman et al., 2008). Through this channel, clown interventions can also exert positive effects on hospital staff and parents (Finlay et al., 2013).

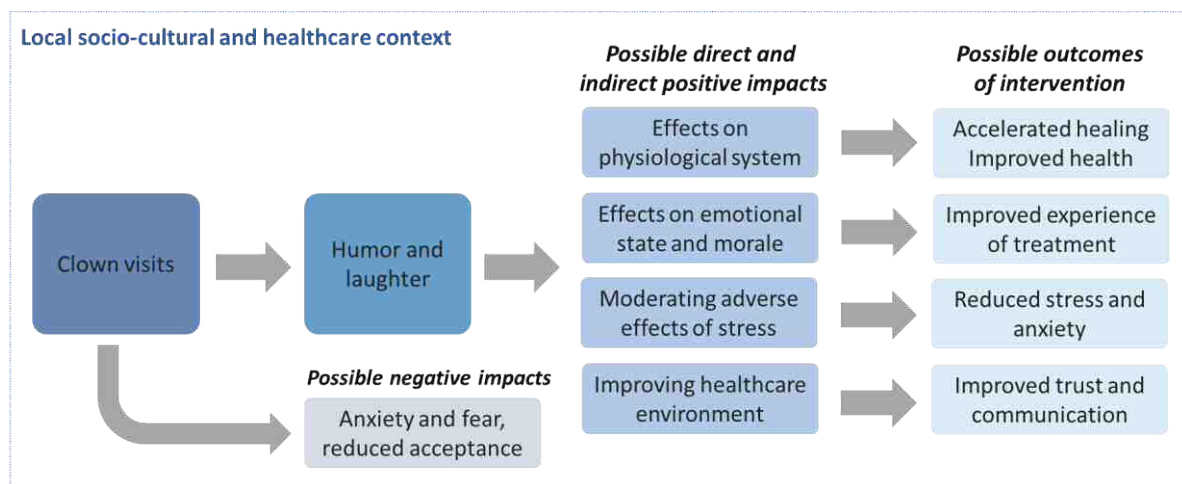


Figure 1 - Theory of change: The possible impacts of clown visits in hospitals on pediatric patients

Researchers have also stressed potential negative implications of clown visits in healthcare settings. While they can be received well by some children, not all children may respond positively to these types of interventions. Despite clowns visiting hospitals being trained to be friendly and non-threatening, some children may have a fear of them or find their appearance and behavior unsettling (Meiri et al., 2017). This can lead to increased anxiety and distress for these children,

making the hospital experience even more challenging. Furthermore, different cultures have diverse attitudes and beliefs about clowns and their role in society (Gilboa-Negari et al., 2017). In some cultures, clowns may be associated with negative connotations, and their presence may not be received well by all families.

In certain cases, clown visits may inadvertently interfere with medical procedures or treatments, as they could distract medical staff or disrupt the healthcare routine (Vagnoli et al., 2005). There may also be situations involving serious discussion, life-threatening circumstances, and high anxiety where humor may not be appropriate, although evidence suggests that also under difficult circumstances, clowns can have a positive impact (Ilan et al., 2018; Kinsman et al., 2008; Samson & Gross, 2012). Furthermore, even if clown visits improve psychological well-being of pediatric patients in the short-term, the effects may only be short lived (Pinquart et al., 2011) and only limited evidence exists as to the extent of long-term impacts.

Despite these potential caveats, many studies have documented positive effects of clown visits on hospitalized children. Reviewing the findings from 24 randomized and non-randomized controlled trial studies, Lopes-Júnior et al. (2020) concluded that the presence of clowns during medical procedures and treatments as part of routine care for chronic conditions can improve health conditions of patients. Children in some of the reviewed studies were found to report less anxiety and improved mental health showing reduced stress, fatigue, pain, and feelings of distress (see also Karisalmi et al., 2020; Kocherov et al., 2016; Meiri et al., 2016a; Vagnoli et al., 2010; Wu et al., 2022).

Recent meta-analyses (n=16 studies and n=8 studies) confirmed the positive impacts of clown visits in reducing stress and anxiety levels among children (Sridharan & Sivaramakrishnan, 2016; Zhang et al., 2017). The studies also reported positive, but weaker effects on children's parents, suggesting the presence of positive spill-overs (Arriaga & Pacheco, 2016; Costa Fernandes & Arriaga, 2010; Dionigi et al., 2013). In general, the results show that clown interventions can be effective in decreasing negative emotions and psychological symptoms and in enhancing the well-being of patients and their relatives (Alberto, 2018). The interventions also led to better compliance during stressful or unpleasant treatments (Arriaga et al., 2020; Goldberg et al., 2014; Jacob et al., 2022; Meiri et al., 2016b; Viggiano et al., 2015; Yildirim et al., 2019).

Aside of reducing anxiety and stress, clown visits have also been shown to be effective in relieving acute pain in children. A recent meta-analysis summarizes this evidence and shows that clown visits can contribute to lowering pain and reduce the length of hospital stays (Ding et al., 2022). This can ultimately lead to cost savings for the hospitals (Kocherov et al., 2016). Analyzing the evidence from six studies, Fusetti et al. (2022) show that clown therapy can be effective in reducing procedural pain in children, particularly for school-aged children and adolescents (see also Bertini et al., 2011; Krieger et al., 2022; Wolyniez et al., 2013). Overall, while results on anxiety and stress levels are more consistent, evidence for reductions in pain levels is more mixed with some studies finding no significant effects (Felluga et al., 2016).

Existing research provides strong evidence in support of the use of clown interventions in various healthcare settings. However, most studies rely on small sample sizes and a focus is often placed on single treatments and specific outcomes without considering the full patient experience. Also, while most studies in the literature focus on the impacts of clown interventions in high-income countries with a developed healthcare infrastructure, the impacts are explored less well among

vulnerable populations in low-income settings. Research from Israel (Gilboa-Negari et al., 2017; Kocherov et al., 2016; Newman et al., 2019), Turkey (Alparslan & Bozkurt, 2017; Kurudirek & Arkan, 2020) and Pakistan (Javed et al., 2021) provides suggestive evidence on the positive potential of clown visits in hospitals in the Middle-Eastern region, showing reduced stress, anxiety, and pain levels among treated children. Further research suggests positive effects of clown visits also on children with previous traumatic experience, including children who were allegedly sexually abused (Tener et al., 2012) or who survived a disaster (Ilan et al., 2018).

To the best of our knowledge, no study to date examines the effect of clown visits on a large sample of children nor across a broad range of non-chronic diseases. We fill this research gap by analyzing a sample of 1,557 children with more than 150 different types of diseases classified according to ICD 11. This broader scale and scope of the study gives a more comprehensive overview of the overall effect of clown visits in health care. In addition, we are the first to analyze effects beyond the well-being and recovery of patients by looking at the effects of hospital clowns on the public perception of hospitals. The unique focus of this study on Palestine allows us furthermore to understand the impact of clown visits on children living in an environment characterized by socio-political tensions and conflicts, challenging healthcare access, and limited resources.

### **3. Context and background information**

#### ***The Health Situation in Palestine***

The health situation in the Palestinian territories has been characterized by various challenges, stemming from the longstanding Israeli-Palestinian conflict and the complex political situation in the region (Horton, 2009). About 5 million Palestinian refugees live in Palestine, Jordan, Syria, and Lebanon (Waterston & Nasser, 2017). The two main areas of the Palestinian territories, the West Bank and the Gaza Strip, face unique health issues that affect the local population's well-being.

In the West Bank, the Palestinian Authority is responsible for governing and providing healthcare services. However, limited resources, restricted access to facilities, and ongoing security concerns have hindered the development of a robust healthcare system. The border wall separating Israel and the West Bank has also posed obstacles to accessing medical services, leading to delays in treatment for many Palestinians (Mataria et al., 2009).

In the Gaza Strip, the situation is particularly dire due to the blockade imposed by Israel and Egypt since 2007, when Hamas took control of the territory. The blockade severely restricts the flow of goods, including medical supplies and equipment, leading to a scarcity of essential medicines and medical equipment (Keelan, 2016; Mataria et al., 2009). Additionally, the constant threat of conflict and Israeli military operations has resulted in significant physical and psychological trauma for the local population.

Both regions face high rates of chronic diseases, inadequate sanitation, and malnutrition. Particularly Children are affected by these conditions. While mortality rates of Palestinian children are comparable to neighboring Arab countries, progress has stalled in the past years. IN addition, violence against children and stressful experiences have led to high burden of mental health problems (Waterston & Nasser, 2017).

During times of conflict or crisis, the healthcare infrastructure struggles to cope with the demand for medical services, particularly in the Gaza strip. The shortage of healthcare personnel and facilities, as well as difficulties in obtaining permits for medical travel outside the territories, compound these challenges further.

In recent years, efforts by international organizations and non-governmental organizations (NGOs) have aimed to alleviate some of the health disparities in the Palestinian territories. Nevertheless, the deeply entrenched political situation remains the root cause of many of the health challenges faced by the local population. Addressing the health disparities requires not only a focus on immediate humanitarian aid but also long-term efforts to promote peace, stability, and sustainable development in the region (Mataria et al., 2009).

### ***The activities of Red Noses in Palestine***

Clown visits have the purpose of bringing joy to people who face a time of hardship. One focus of organizations that use clown visits is on visiting children in hospitals. While these programs are well established in many developed countries, they can be of special interest to vulnerable populations in less developed countries. Our project partner Red Noses International (<https://www.rednoses.ps/>) started to operate in public hospitals in Palestine in 2010 cooperating with different hospitals all over the country. More recent activities include the expansion to additional developing countries.

Clowns visit hospitals in the West Bank once to twice a week or once every second week. The number of visits depends on the size of the hospital. The partner organization sets the schedule for the clown visits monthly according to the availability of the clowns and in individual agreement with the hospitals. Usually, the visits take place on the same day every week.<sup>1</sup>

For a clown visit, trained individuals change into a “clown” wardrobe that includes a white hospital gown, a red nose and, in most cases, a colorful headpiece such as a hat or artificial hair. Once ready, the clowns start their visits by moving from one hospital room to the next. Depending on the patients’ interest in the clowns, they stay for five to fifteen minutes within each room. Each room has several beds with patients (mostly of a similar age range) and typically multiple caregivers and family members per patient are present in the Palestinian context.

Most visits include musical parts and sketches. For very young children, the clowns work with music and optical stimuli. After first performing sketches and/or songs for the full audience in the room, clowns adapt their performance to engage with every patient individually, before performing for the full audience in the room again. In some cases, hospital staff is present in the rooms and attends the performances. Some of the patients follow the clowns to other rooms.

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<sup>1</sup> The researchers were able to attend multiple clown visits before the start of the intervention study. One during the design phase of the project in a pediatric department in a hospital in Austria and two during the kick-off phase for the pilot in Palestine. Of the latter, one was held in a hospital’s geriatric department and one in the target set-up of a hospital’s pediatric department.



## 4. Methods and research design

### *Sampling and data*

Our study examines the impacts of clown visits in hospitals on the well-being and recovery of pediatric patients as well as the overall perception of the public health care system. The main target group of our study are children admitted to hospitals because of a non-chronic disease or injury. For ethical reasons, we do not have directly engaged with the children but instead collected our data through interviewing their caregivers after the hospital stay. While caregiver's views can deviate from the experience of the children, we expect caregivers, especially those who accompanied the child during the hospital stay, to be qualified in assessing the child's experience during the stay.

The data collection for the study took place between August 2022 and March 2023. Over the course of the study period, we collaborated with eight different hospitals<sup>2</sup>. The data collection was conducted by a survey firm in form of telephone interviews after the hospital stays (n= 1557 interviews). Data collectors from the survey firm visited the hospitals multiple times per week to ask caregivers for their consent to participate in our study and to collect their contact details. Importantly, the information given to caregivers about the study did not include any information about the clown intervention. Instead, caregivers were asked to participate in a study assessing the hospital stay of their child.

For those patients whose caregivers agreed to participate in the study, hospital data were collected from the hospital staff. However, due to restrictions by the Palestinian authorities, we were unable to obtain any objective health data from the hospitals. A minimum of 10 and maximum of 36 days after the recruitment, data collectors called the caregivers for a telephone interview. Interviews were conducted in Arabic and were later translated to English. Participants had, at any time, the right to withdraw from the study. At the time of our data collection, clown interventions were not common in Palestine: Only about 5 percent of children in the sample knew about hospital clowns before being admitted to the hospital.

### *Treatment and randomization process*

To evaluate the effect that clown visits have on children in the hospital, we compared health outcomes for children who saw a clown with those who did not. By randomly varying the date of the clown visits to the hospitals, we created an experimental treatment and control group. As preventing children from seeing a clown as a potentially beneficial health intervention is ethically problematic, we did not change the total number of clown visits to a hospital nor prevented the visits entirely, but only randomly varied the day of the week when the clowns would come to the hospital. We thereby maintained the frequency of clown visits in line with the operations of our project partner and the clown's services were hence provided to the same number of children irrespective of our intervention study.

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<sup>2</sup> Initially, we started the study with six hospitals. One of the six initial hospitals dropped out after the first two weeks due to internal issues unknown to the researchers. In week 14 and week 15 of the study, two additional hospitals were added to compensate for the hospital that dropped out. The hospital that dropped out in week 2 is a large hospital with many patients; therefore, two additional hospitals were necessary to reach the desired sample size given the period of the study. From week 16 onwards, we stopped collecting data in one hospital because the number of patients meeting our criteria was very limited.

The randomization process is illustrated in Figure 2. All patients who were present on a day with a clown visit belong to the treatment group, and those without to the control group. This allocation creates a unique design as our cluster and randomization units are not the same. Clown visits are randomized throughout the week and nature assigns patients into the control or treatment group depending on the day(s) the patients stay in the hospital.

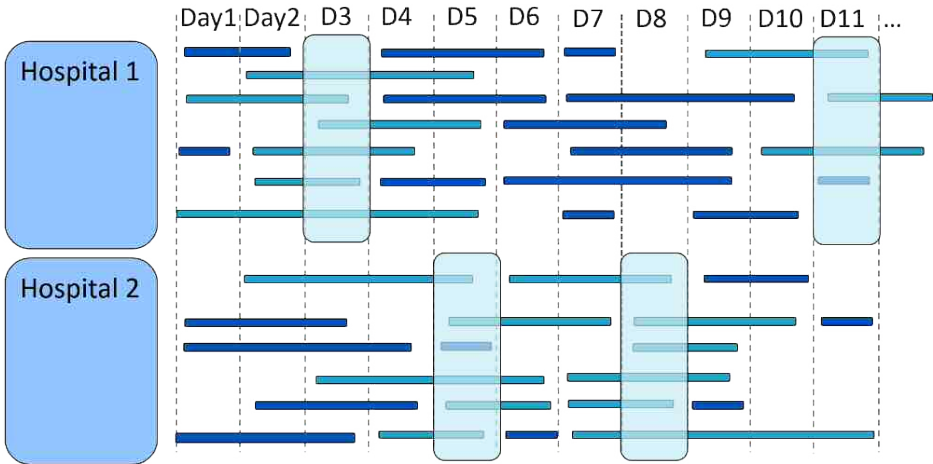


Figure 2: Assignment to treatment and control group. Example using two hospitals, eleven days and small number of beds. Lines indicate the occupation of a hospital bed by one patient while the length indicates the number of days the bed is in use. The transparent blue rounded rectangle indicate that for this day and hospital a clown is visiting. The green and dark blue lines show whether a patient has seen a clown or not and is part of the treatment or control group, respectively.

**Outcome variables**

Our main outcomes of interest are standardized indices that measure: (1) the perceived change in well-being of the child during the hospital stay (well-being index); (2) the subjective recovery of the patient as measured by caregivers (recovery index); and (3) the caregiver’s perception of public hospitals (perception of hospital index). Table 1 summarizes the variables contained in the three different indices. All variables are subjective measures as rated by the caregiver using a Likert scale where 1 represents the worst outcome and 7 the best outcome. We expect the judgements to be informative as 96 percent of the caregivers were present every day their child was at the hospital.

Table 1 – Description of main outcomes variables considered in the analysis

Outcome	Variable	Question
Well-being index	Mood change (mood on the last day of hospital stay vs. mood on the first day of hospital stay)	Please rate your child's mood on the day of arrival/last day of hospital visit.
	Comfort change (comfort on the last day of hospital stay vs. comfort on the first day of hospital stay)	Please rate how comfortable your child felt around the nurses and physicians on the day of arrival/last day of hospital visit.
	Appetite change (appetite on the last day of hospital stay vs. appetite on the first day of hospital stay)	Please rate your child's appetite on the day of arrival/ last day of hospital visit.
Recovery index	Overall recovery of the child	To what extent has your child recovered?
	Ease of doing every-day tasks within the house	Please rate how easy it is for your child to do everyday tasks inside the house
	Ease of playing with other children	Please rate how easy it is for your child to play with other children
	Ease of going to daycare/school/kindergarten	Please rate how easy it is for your child to go to school/kindergarten/ summer camp
	Ease of participating in family gatherings	Please rate how easy it is for your child to participate in family gatherings?

Perception of hospital index	Trust in physicians and nurses to take good care of child's needs	Please rate how much you trust the physicians and nurses to take good care of your child's needs
	Recommend hospital to friends and family	What is the probability that you will advise your friends and relatives to use the same hospital?
	Quality of services at public hospitals in Palestine	Please rate the quality of services at public hospitals in Palestine
	Satisfaction of overall hospital stay	How satisfied are you with your overall experience at that hospital (only this stay)?

The well-being index is standardized between -1 (reduced well-being over time) and 1 (increased well-being over time), while the other two measures are standardized between 0 and 1. The Appendix shows how the indices were standardized. Cronbach's Alpha was calculated for each index to assess the internal consistency of the scale. The following are the values for each index, showing that the internal consistency is high: Well-being index: 0.68; recovery index: 0.75; perception of hospital index: 0.80.

***Summary characteristics and balance checks***

Table 2 shows summary statistics for the characteristics of the children, their households, and their caregivers who responded to the telephone survey. The data helps to describe the sample that is part of the experiment and shows that it is well balanced across treatment and control group. While a few balance tests are significant at the 5 percent level, this can be expected by chance. The variable "length of hospital stay" is the only variable of concern, since the difference in means between treated and control groups is large and significant. This arises due to the design of the study, where children with a longer stay at the hospital were more likely to be present on a day on which a randomized clown visit took place. As this variable may also be related to children's health status with sicker children staying longer time periods in hospitals, we control for it in the regressions to mitigate any potential confounding influences.

Most of the households in the sample are located in rural areas (60 percent) and have an average of 5.68 household members. The net average household income is ILS 3656.60 (approximately EUR 900). The average monthly household income in Palestine is ILS 4 586.60, showing that the households visiting the hospitals are poorer than the average household in the country. This is because public hospitals in Palestine are mostly visited by households with a lower socio-economic status. The education level is high, with nearly 50 percent of households having at least one member who completed tertiary education. On average, only a minority of households have members who are looking for work (6.5 percent).

In most cases, the caregiver during the child's hospital stay was the mother (89 percent). The average caregiver was 32 years old at the time of the survey, married, had approximately three children under the age of eighteen, and spent seven hours working outside of the house. In contrast, the caregivers' partners tended to work nearly 43 hours per week outside of the house. The life satisfaction of the respondents was reported with an average score of 5.20 out of a maximum score of 7 (very satisfied).

The child patients are split equally across gender and are young, with an average of 4.4 years of age. Around 44 percent go to daycare/kindergarten/school regularly. The average length of the hospital stay was approximately 6 days. Only 5 percent of the sample were aware that clowns would visit the hospital before their treatment stay.

Table 2 – Summary Statistics and Differences between treatment and control groups

	Pooled sample		Treatment group	Control group	Differences
	Mean	St. Dev.	Mean	Mean	<i>p</i> -value
<b>Child's household</b>					
Household is rural	0.64	.48	.64	.63	0.80
Household size	5.68	2.59	5.81	5.45	0.01**
Net household monthly income (ILS)	3656.60	9162.63	3773.19	3435.26	0.49
Highest level of education completed amongst all HH members is tertiary education	.49	.50	.47	.53	0.03**
Number of household members looking for work	.37	.65	.37	.38	0.89
Minutes needed to reach extended family for support	14.07	58.45	15.60	11.21	0.16
<b>Caregiver during child's hospital stay (= Survey participant)</b>					
Age	32.44	7.83	32.57	32.21	0.38
Hours spent working per week outside house (paid and unpaid)	7.00	16.96	8.00	6.55	0.11
Works for an income	.17	.37	.16	.19	0.13
Number of children <18	3.11	1.52	3.19	2.99	0.01**
Married	.96	.19	.97	.95	0.02**
The relationship to the child is "mother"	.89	.31	.90	.87	0.30
Hours partner spends working per week outside house (paid and unpaid)	42.75	24.48	42.73	42.75	0.98
Satisfaction with life (scale of 1 (very dissatisfied) to 7 (very satisfied))	5.20	1.86	5.21	5.20	0.90
Hospital stay paid through government insurance	.78	.42	.77	.79	0.46
<b>Child who had a hospital stay</b>					
Male	.52	.50	.52	.54	0.35
Age	4.40	3.10	4.42	4.37	0.75
Goes to daycare/kindergarten/school regularly	.44	.50	.43	.47	0.15
Awareness of hospital clowns before hospital stay	.05	.22	.05	.05	1.00
Length of hospital stay	6.06	10.50	8.01	2.40	0.00***
Observations	1557		1015	542	

P-values: \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

### ***Estimation strategy***

To estimate the impact of clown visits on our outcomes of interest, we use the following regression model:

In our main specifications, the dependent variables ( $Y_i$ ) is one of three indices measuring for each child  $i$  the well-being change during the hospital stay, the recovery process, and the caregiver's trust in the public health care system.  $T_i$  is a dummy variable indicating the treatment status of the individual patient.  $C_i$  is equal to one if a child saw a clown during the hospital stay at least once, and zero otherwise. As we cannot perfectly ensure that a child actually saw the clown during the clown visit to the hospital, the coefficient  $\beta$  corresponds to the intention to treat effect (ITT).

$X_i$  is a vector of control variables. We control for the age and sex of the child, and the reason for the child's hospital stay according to the most recent International Classification of Diseases (ICD-11). In addition, we include hospital, month, and weekday fixed effects. Including these control variables increases the precision of the estimates. In addition,  $L_i$  includes the length of the child's hospital stay in days. This control variable is necessary to remove the potential bias of the estimated treatment effect because sicker children had longer hospital stays and were hence more likely to be treated.

### ***Challenges to identification: Attrition and compliance***

Spill-over effects may be a potential issue as most children stay in the hospitals for multiple days and share the room with other children. A child who saw a clown may therefore affect other children in the control group who arrived at the hospital later. Furthermore, those children who are mobile can interact with patients from other rooms, likewise potentially affecting their outcomes. While such spill-over effects may be relevant for individual cases, we do not expect them to exert a strong influence and systematically bias our findings.

As mentioned above, the length of the hospital stay can create problems to the randomization. Given our allocation process, patients who stayed longer in the hospital had a higher chance of being present during a clown visit compared to those who stayed for a shorter period. As patients who stayed longer were likely to be less healthy than their peers this might have introduced a source of bias into our experimental design. To counterbalance this effect, we control for the ICD11 disease category and the length of stay of the children in the hospitals in our models. We expect these mitigation measures to be sufficient, given that while clown interventions being unlikely to have a strong effect on the length of the medical treatment required and the duration of stay in the hospital. As additional robustness test, we have estimated models that do not control for the length of stay. The findings of these models are largely consistent with our main results.

Attrition refers to the phenomenon where participants may withdraw from a study over time. This poses a particular challenge if dropout rates are unevenly distributed across treatment and control groups. In our pilot study, however, attrition was relatively low. Concerns such as participants withdrawing when contacted for a telephone interview were effectively minimized. Together with our project partner, we decided early on to incentivize participation in the study through a lottery,

which appeared to have successfully reduced attrition rates. The lottery prizes were supermarket vouchers, randomly awarded to survey participants at the end of the study.

Overall, 77 percent of the recruited individuals completed the survey, while approximately 23 percent did not participate due to issues such as incorrect contact information, phones being out of coverage, or interviews being prematurely terminated. These dropout patterns were equally distributed across both the treatment and control groups, preventing significant imbalances. As shown in Table 1, there is no systematic difference in attrition between the two groups, indicating that it is not correlated with treatment status.

Patients can decline a clown visit, which means that although they were randomly assigned to the treatment group, they may have opted out of the intervention. This could introduce bias if the decision to refuse a visit is driven by certain unobservable characteristics. However, our project partner reports that refusals are rare. To mitigate potential bias, we employ an intention-to-treat (ITT) approach, where all children assigned to the treatment group are included in the analysis, regardless of whether they actually received a clown visit, as long as they were present on the day of the visit.

## 5. Results

### *Perception of clown visits in the study sample*

Table 3 provides descriptive information on the perception of clown visits as rated by the caregiver for him/herself and for their child. The panel “General perception” shows the treated and control group’s opinion of clowns and hospital clown visits. On average, caregivers have a positive opinion of hospital clowning. Approximately 95 percent would want a hospital clown visit for their child and the average rating of hospital clowns is with 6.6 points out of 7 very high.

When considering differences in the perception of clown visits between treatment and control group, we find no major differences, showing that also those caregivers whose child did not see a clown during the hospital stay have a high opinion of hospital clowning. When looking at children’s opinion about clowns, approximately 70 percent of caregivers reported that their child likes clowns. This means that around 30 percent are either indifferent (9 %) towards clowns, do not like them (9 %), or the caregiver did not provide any information on the question.

The panel “Perception on hospital clown visits” shows the rating of clown visits for the treated group. On average, the children’s reaction to the clowns as rated by their caregivers is very good (5.94 out of 7). Importantly, the caregivers believe that their children found the clowns were funny (6.06 out of 7) and that their mood improved a lot (6.16 out of 7). Lastly, 70 percent of caregivers share the clown visit experience with family, friends, other patients, or on social media.

Table 3 – General perceptions of clown visits in hospitals

	Treatment group mean	Control group mean	Observations
<b>General perception</b>			
Child likes clowns (in general, not only hospital clowns)	0.72	.70	1557
Caregiver’s perception of hospital clowns (Likert scale)	6.65	6.63	1543
If had the choice, caregiver would want a clown to visit child in hospital	.96	.95	1545
<b>Perception of hospital clown visits (treated group)</b>			
Rating of child’s reaction to the clowns (Likert scale)	5.94	-	757
Rating of how funny the child thought the clowns are (Likert scale)	6.06	-	755
Rating of how child’s mood was affected by clown visit (Likert scale)	6.16	-	754
Rating of how funny the caregiver thought the clowns are (Likert scale)	6.53	-	758
Shared information on clown visits on social media, with friends and/or with family, and/or with other patients	.70	-	770

Note: All Likert scale variables are subjective measures as rated by the caregiver using a Likert scale where 1 is the worst outcome and 7 the best outcome. The “General perception” variables are measured for both treated and control children. The unit of analysis is the child/caregiver as rated by the caregiver. The “Perception of hospital clown visits” variables are measured for treated children and include all hospital clown visits. The unit of analysis is a clown visit as rated by the caregiver.

### ***Health challenges in Palestine and the role of clown visits***

This section explores the health situation in Palestine based on the three main health outcomes considered in our analysis and discusses how hospital clowns can (potentially) contribute to improving the situation. Table 4 below provides descriptive information on patients’ health condition and hospitalization experiences distinguishing between children in the treatment and control group without controlling for additional variables.

The first panel looks at the child’s well-being during the hospital stay. As assessed by caregivers regarding their child’s mood, appetite, and comfort with hospital staff, the well-being of children is low at the beginning of the hospital stay. This is what would be expected given that the children are sick. Treated children have a statistically significantly lower average well-being than children in the control group on the day of arrival. This is, as already discussed, due to the design of the study where children with a more severe sickness are more likely to get treated.

Hospital clown visits have the potential to improve the children’s well-being through spreading joy and thereby improving their hospital stay. When looking at the average well-being on the last day of the hospital stay, this seems to be the case. While the hospital stay itself improves the well-being of children with all well-being indicators improving substantially also for the control group, the clowns seem to have an additional positive effect. While the average well-being indicators as rated by caregivers for treated children were lower than those of the control group children at the beginning of the stay, they are now statistically significantly higher at the end of the stay.

Hospital clowning may also have a positive effect on the child’s recovery. The second panel shows that the average recovery indicators, as reported by caregivers, are lower for treated children than for control children. This is again due to sicker children being more likely to being in the treated group, and sicker children taking a longer time to recover. When looking at the average outcomes for the control group, the average recovery at the time of the interview is quite high and no

markable differences are visible between control and treatment group. The treatment effects, however, cannot be assessed by simply comparing mean differences, but requires a more elaborate modeling approach which we present in the next section.

Table 4 – Summary statistics of the main health outcomes considered

	Treatment group mean	Control group mean	Difference ( <i>p</i> -value)
<b>Child's well-being during hospital stay</b>			
Mood on day 1 of hospital stay (Likert scale)	2.16	2.63	0.00***
Appetite on day 1 of hospital stay (Likert scale)	1.88	2.46	0.00***
Comfort with hospital staff on day 1 of hospital stay (Likert scale)	4.46	4.70	0.08*
Mood on last day of hospital stay (Likert scale)	5.73	5.44	0.01**
Appetite on last day of hospital stay (Likert scale)	5.44	5.10	0.00***
Comfort with hospital staff on last day of hospital stay (Likert scale)	5.45	5.21	0.04**
<b>Child's recovery after hospital stay</b>			
Ability to do tasks in house (Likert scale)	6.09	6.27	0.04**
Ability to play with other children (Likert scale)	6.08	6.31	0.01**
Ability to go to school (Likert scale)	3.65	4.18	0.00***
Ability to attend family events (Likert scale)	6.17	6.31	0.09*
Recovery at time of interview (Likert scale)	5.96	6.09	0.11
<b>Caregiver's perception of public hospitals</b>			
Trust in hospital staff (Likert scale)	5.96	5.93	0.64
Quality of public hospitals (Likert scale)	4.60	4.63	0.76
Would recommend hospital (Likert scale)	5.66	5.58	0.43
Satisfaction of hospital stay (Likert scale)	5.09	5.16	0.47
Chose hospital because of quality of medical services	.28	.24	.10
Observations	1015	542	

Note: All Likert scale variables are subjective measures as rated by the caregiver using a Likert scale where 1 is the worst outcome and 7 the best outcome.

P-values: \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

Lastly, hospital clowning has the potential to improve the perception of the public healthcare system in Palestine by improving the healthcare environment. The average outcomes of the indicators for the control group in the third panel show that the perception of public hospitals is moderate and there exists room for improvement. For example, the average score on the Likert scale for the quality of public hospitals is 4.63 out of 7. In addition, only 24 percent of the interviewed caregivers reported that they have chosen the respective hospital because of the quality of its medical services. Hospital clowning does not seem to change the average perception of hospitals. For three out of the five outcomes, the treated group shows a higher average score than the control group. However, these differences are not statistically significant.

### ***Estimating the impacts of clown visits in hospitals***

Table 5 shows the main regression results for each of the outcome variables. Seeing a clown in hospital at least once increased the well-being of a child as reported by caregivers during the hospital stay. Compared to the control group, the overall well-being index was by 0.083 or 0.25 standard deviations higher for children in the treatment group (column 1). Since treated children



had a lower average well-being score on the day of arrival at the hospital, they had more room for improving their well-being. Column (2) controls for this by including the variables measuring the appetite, comfort, and mood on day 1 of the hospital stay. While this reduces the size and significance of the treatment effect, it is still substantial showing a 5 percent increase in well-being in the treatment compared to the control group. Columns (3) and (4) consider the other two outcomes for which no beneficial treatment effects are observed.

Table A1, A2, and A3 in the Appendix show the results for each of the variables included in the composite indices separately. Table A1 shows that the positive treatment effects on the child's well-being is primarily driven by a change in mood and appetite. Table A2 and A3 show that none of the individual variables within the recovery and perception of hospital stay indices are statistically significant.

Table 5 – Linear regression models testing for the impacts of clown visits on the health outcomes

Outcome index:	(1) Well-being	(2) Well-being	(3) Recovery	(4) Hospital stay
Treatment	0.083*** (0.019)	0.033** (0.012)	-0.011 (0.010)	-0.009 (0.017)
Length of hospital stay	0.001 (0.001)	0.001 (0.001)	-0.002*** (0.001)	0.001 (0.001)
Appetite day 1		-0.046*** (0.004)		
Comfort day 1		-0.005 (0.004)		
Mood day 1		-0.060*** (0.004)		
Constant (control group mean)	0.437*** (0.067)	0.696*** (0.063)	0.755*** (0.043)	0.771*** (0.042)
Observations	1492	1453	1531	1551
R <sup>2</sup>	0.165	0.441	0.105	0.071
AIC	772.598	123.679	-382.044	-76.127

Note: Robust standard errors clustered by hospital and month in parentheses. All regressions contain the following control variables: age of child, gender of child, disease according to ICD11, hospital fixed effects, month fixed effects, and weekday fixed effects.

P-values: \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

### ***Heterogeneity analyses: Differential intervention impacts on children***

Next, we explore differences in the effects of the intervention testing whether clowns had a stronger impact (a) by sociodemographic characteristics of the children and their households and (b) by factors related to the hospital stay of the children. In these extended analyses shown in Table 6, we focus on the well-being index as the only outcome that was consistently positively affected by the clown visits in the hospitals.

Households in our sample had a lower monthly income than the average in Palestine. However, when looking at effect differences by income within our sample, we find that children from households above the poverty line benefited more from the intervention (model 3). Children from this group had on average a 6.7% higher well-being impact of the intervention compared to children from poorer families. The latter also benefited, but to a lesser extent. In line with this, we find suggestive evidence that children from parents with at least secondary education as well as parents who are working benefited more, suggesting a positive socioeconomic gradient in the effect of the intervention.

Table 6: Heterogeneity effects for well-being index

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Treatment	0.074*** (0.019)	0.076*** (0.028)	.041 (0.030)	0.033 (0.091)	0.072*** (0.018)	0.058 (0.111)	0.065** (0.030)	0.119 (0.101)	0.035 (0.032)
<b>Sociodemographics</b>									
Treatment × Infant	0.042 (0.048)								
Treatment × Male		0.012 (0.034)							
Treatment × Above poverty line			0.067* (0.036)						
Treatment × At least secondary school				0.052 (0.092)					
Treatment × Working					0.060 (0.039)				
<b>Hospital stay characteristics</b>									
Treatment × Less than a week in hospital						0.025 (0.116)			
Treatment × First hospital stay							0.024 (0.035)		
Treatment × Caregiver always present during stay								-0.039 (0.106)	
Treatment × Child likes clowns									0.064* (0.036)
Observations	1492	1492	1470	1492	1492	1492	1492	1492	1492
R <sup>2</sup>	0.165	0.165	0.165	0.165	0.169	0.165	0.166	0.166	0.307
AIC	775.496	774.472	760.410	776.151	768.864	776.481	775.044	774.446	767.906

Note: Robust standard errors clustered by hospital and month in parentheses. All regressions contain the following control variables: age of child, gender of child, disease according to ICD11, hospital fixed effects, month fixed effects, and weekday fixed effects. For interaction effects with dummies created from continuous variables, the continuous variable is included as a control variable. P-values: \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

A potential explanation for why children from families with a higher socio-economic status benefit more from clown visits may be that these children are more used to clowns. Children from wealthier families often have greater access to a variety of educational and recreational resources, including books, movies, theater, and diverse social interactions (Lareau, 2011). This exposure can contribute to a broader understanding and appreciation of different types of humor. In addition, parents from a higher socio-economic background may engage in cognitively stimulating activities to a greater extent which may make their children more attuned to humor (Bradley & Corwyn, 2002).

Finally, we study the role of factors related to the hospital stay and children's attitudes towards clowns. Here, we find that the impacts of clown visits were mainly concentrated among children who had an overall positive attitude towards clowns (model 4), whereas we do not see any major effects for those children who do not like clowns. For the former group with a positive attitude, clown visits led to a well-being improvement of 6.4% on average. These findings suggest that the effectiveness of clown visits in improving children's well-being is highly dependent on their pre-existing attitudes towards clowns, highlighting the importance of considering individual preferences as well as social and cultural contexts when designing therapeutic interventions in hospital settings

## 6. Conclusion

This study investigates the effects of hospital clown visits on pediatric patients' well-being, recovery, and trust towards the healthcare system in Palestine. Hospitalization can be distressing for children, potentially affecting treatment outcomes and healthcare utilization. Clown visits in hospitals can be an effective and low-cost intervention to mitigate the stress, increase well-being, and improve health outcomes.

We conducted a randomized control trial in collaboration with the NGO Red Noses International to test for the impacts of clown visits. Children were randomly assigned to a control group without clown visits and a treatment group with clown visits during their hospital stays. The study involved 1,557 children with diverse medical conditions. It addresses a research gap in understanding the impact of clown visits for children living in a highly vulnerable environment characterized by sociopolitical tensions and conflicts, challenging healthcare access, and limited resources.

Our findings show a significant positive impact of clown visits on the well-being of pediatric patients during their hospital stay. For children who experienced a clown visit, we observed an increase of 0.25 standard deviations in their overall well-being score compared to those without clown visits. While the study does not find any effects on patients' subjective recovery (as measured by caregivers) or caregivers' perception of public hospitals, it shows the potential positive impact of clown visits in enhancing the hospital experience for children. The children's and caregivers' opinions about hospital clowning were positive, suggesting an important role of hospital clowning in the Palestinian contexts.

Further analyses explored potential variations in the effects of clown interventions. We found that children from families above the poverty line benefited more from the clown visits, suggesting a potential socioeconomic disparity in response to the visits. Additionally, children with a positive attitude towards clowns experienced a larger well-being improvement, emphasizing the importance of individual attitudes to humor and clowning as a moderating factor.

The findings underscore the potential of non-medical interventions like clown visits to alleviate the psychological burden of hospitalization for children and to increase their well-being, particularly in vulnerable settings like Palestine. By tailoring interventions to specific needs and addressing potential disparities, policy-makers can ensure that the benefits of such programs reach all children and can contribute to a more holistic and child-centered approach in healthcare.

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## Appendix

Table A1: Child's well-being in hospital & hospital experience

Outcome variables:	(1) Comfort change	(2) Mood change	(3) Appetite change
Treatment	0.287** (0.131)	0.578*** (0.135)	0.611*** (0.141)
Length of hospital stay	0.010 (0.007)	0.001 (0.007)	0.012* (0.006)
Observations	1497	1484	1476

Table A2: Recovery measures

Outcome variables:	(1) Recovery today	(2) Tasks inside	(3) Play with children	(4) Go to school	(5) Family events
Treatment	-0.045 (0.080)	-0.058 (0.074)	-0.110 (0.079)	-0.190 (0.159)	-0.054 (0.082)
Length of hosp. stay	-0.009* (0.005)	-0.012** (0.005)	-0.017*** (0.006)	-0.009 (0.008)	-0.012** (0.005)
Observations	1546	1535	1541	1201	1535

Table A3: Caregivers perception of public hospitals

Outcome variables:	(1) Satisfaction of hospital stay	(2) Trust in hosp staff	(3) Recommend hospital	(4) Quality of public hosp
Treatment	-0.095 (0.113)	-0.013 (0.101)	-0.017 (0.123)	-0.039 (0.127)
Length of hospital stay	0.001 (0.006)	0.002 (0.004)	0.008 (0.006)	0.014*** (0.005)
Observations	1552	1548	1535	1529