Clinical paper

Wellbeing, emotional response and stress among lay responders dispatched to suspected out-of-hospital cardiac arrests

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Abstract

Background: Systems for smartphone dispatch of lay responders to perform cardio-pulmonary resuscitation (CPR) and bring automated external defibrillators to out-of-hospital cardiac arrests (OHCAs) are advocated by recent international guidelines and emerging worldwide.

Objectives: This study aimed to investigate the emotional responses, posttraumatic stress reactions and levels of wellbeing among smartphone-alerted lay responders dispatched to suspected OHCAs.

Methods: Lay responders were stratified by level of exposure: unexposed (Exp-0), tried to reach (Exp-1), and reached the suspected OHCA (Exp-2). Participants rated their emotional responses online, at 90 minutes and at 4–6 weeks after an incident. Level of emotional response was measured in two dimensions of core affect: “alertness” – from deactivation to activation, and “pleasantness” – from unpleasant to pleasant. At 4–6 weeks, WHO wellbeing index and level of posttraumatic stress (PTSD) were also rated.

Results: Altogether, 915 (28%) unexposed and 1471 (64%) exposed responders completed the survey. Alertness was elevated in the exposed groups: Exp-0: 6.7 vs. Exp-1: 7.3 and Exp-2: 7.5, (p < 0.001) and pleasantness was highest in the unexposed group: 6.5, vs. Exp-1: 6.3, and Exp-2: 6.1, (p < 0.001). Mean scores for PTSD at follow-up was below clinical cut-off, Exp-0: 9.9, Exp-1: 8.9 and Exp-2: 8.8 (p = 0.065). Wellbeing index showed no differences, Exp-0: 78.0, Exp-1: 78.5 and Exp-2: 79.9 (p = 0.596).

Conclusion: Smartphone dispatched lay responders rated the experience as high-energy and mainly positive. No harm to the lay responders was seen. The exposed groups had low posttraumatic stress scores and high-level general wellbeing at follow-up.

Keywords: Lay responders, Volunteer responders, Smartphone application, Cardiopulmonary resuscitation, Automated external defibrillator, Wellbeing, Stress

Introduction

Dispatch of lay volunteers trained in cardiopulmonary resuscitation (CPR) to nearby out-of-hospital cardiac arrests (OHCAs), with the use of a smartphone application, can increase bystander CPR rates,\textsuperscript{1} and has been associated with an increase in lay-operated use of automated external defibrillators (AEDs).\textsuperscript{2} This concept has emerged around the world,\textsuperscript{1–8} and in Europe, these systems are initiated in nearly half of all countries.\textsuperscript{3} Recently, international guideli-
nes for cardiopulmonary resuscitation and emergency cardiovascular care. Advocated smartphone aided dispatch of lay volunteers as a strong recommendation. Volunteer-based systems may be favourable from a cost-benefit perspective, both to patients and the healthcare system, but could also be at the expense of the lay responders’ stress-related wellbeing.

Previous studies have shown that professional first-responders such as ambulance personnel, fire fighters and police officers in their line of duty may display an elevated risk of developing stress disorders. It has also been proposed that unprepared bystanders who witness or intervene in a sudden cardiac arrest can react with acute stress. On the other hand, a few descriptive studies on CPR-trained lay volunteers do not indicate a negative effect. For dedicated lay volunteers it might even be an uplifting, meaningful and rewarding experience. Basically trained “Community first-responders” (CFRs), have been described as having personal satisfaction in retaining the role of a CFR, reflecting a degree of altruism. Recent studies have been descriptive in nature, with qualitative designs, lacking an unexposed control group and mostly focused on the negative effects of participating in resuscitation. We aimed to investigate the emotional reactions, both positive and negative, wellbeing and posttraumatic stress disorder (PTSD) symptomatology among smartphone-alerted lay responders dispatched to cases of suspected OHCA directly after the alert and at follow up. As randomization was not feasible, a group of non-dispatched lay responders located at the same alert was used for comparison.

Methods

Trial design
This was an observational prospective cohort study carried out to investigate emotional responses, PTSD symptoms and wellbeing of dispatched lay responders, who were exposed to the scene of a suspected OHCA. Measurements were compared over time and with those from non-exposed lay responders, who were located but not reached by an alert.

Trial Registration: ClinicalTrials.gov Identifier: NCT04165668

Setting
The study was conducted in two Swedish areas: Region Stockholm (area: 6519 km², population: 2.3 million), and Region Västra Götaland (area: 23942 km², population: 1.7 million). The lay-responder system (Heartrunner) involves a smartphone application where CPR-trained layperson can volunteer to be located and dispatched to nearby suspected OHCA to perform CPR and/or bring an AED. A maximum of 30 lay responders within 1320 meters from the suspected OHCA receive a notification alert and are requested to either accept or decline the mission. (For details, see supplementary appendix) The study continued from November 13th, 2019, to April 2nd, 2020, when the lay-responder system was cancelled as a result of the Covid-19 outbreak. Follow-up was launched on February 9th, 2020, addressing respondents who took part in resuscitation efforts after January 9th, 2020, and continued until May 7th, 2020.

Survey and study participants
The study participants were recruited consecutively. As part of the lay-responder system, all lay responders are routinely asked questions about logistics and resuscitation efforts, such as if they tried to reach the scene, succeeded in fetching an AED, or provided CPR. In addition, for the present study, the lay responders also provided answers to study-specific psychological self-rating scales. A web link to an online web-survey was sent as a text message via the short message system (SMS) directly to their smartphone at 90 minutes after the alert, and as a reminder again after three days. At 4–6 weeks after the initial study-specific survey, a follow-up survey was sent to the lay responders who answered the first survey.

Exposure, inclusion and exclusion criteria

Inclusion criteria:

- Located lay responders who were not alerted (unexposed)
- Alerted lay responders who either tried to reach, or succeeded in reaching the scene of suspected OHCA (exposed)

Exclusion criteria:

- Lay responders who declined
- Lay responders who were aborted because of distance, or did not try to reach the scene
- Exposed responders also dispatched “on-duty”
- Unexposed responders who would not have accepted the mission if alerted
- Faults, crossing dates and inconclusive survey answers
- For lay responders who had more than one alert during the study period only one mission was chosen (both exposed and unexposed responders)
- Participants who did not complete any of the self-rating scales

To prevent recall bias, survey answers that was later than 8 days from alert, double alerts before survey answer, participants who had a mission between first survey and follow-up, and crossing mission/survey dates was excluded. Only one alert for each individual lay responder was chosen in descending date order, as follow-up first was first launched later in the study. To avoid answers from potentially uncommitted lay responders in the unexposed group we added the question: if they would have been reached by the alert, had they responded to the mission? (Please see Fig. 1).

Construction of study groups

Unexposed (Exp-0)
The unexposed sample consisted of lay responders who were located at the alert but was not reached by an alert as a result of technical errors within the lay-responder system; mission-server data showed that no technical contact was established with the smartphone. Thus, the unexposed group was recruited at the same occasion as the exposed group, thereby controlling for possible confounding factors such as season, time of day and place of arrest.

Exposed groups 1 and 2 (Exp-1, Exp-2)
The lay responders who accepted the mission and tried to reach the scene of the OHCA were stratified into two groups according to exposure. Exp-1: those who tried but did not reach the scene, and Exp-2: those who reached the scene and saw the victim.

Outcomes, measurements and data sources

1) Primary outcome: the level of emotional response was measured as core affect with use of the Swedish Core Affect Scales
SCAS,25–26 derived from the affect circumplex by Russel & Barrett.27 The instrument measures “state of mind” on 12 affective scales of opposite adjective pairs (e.g., sad–glad) where the level of response ranges from 1–9 where 5 is neutral, using visual analogue scales (VAS). The instrument is validated for the composite use of the dimensions activation and valence, here called: “alertness,” from deactivated to activated, and “pleasantness,” from unpleasant to pleasant. Two proposed rotational dimensions of activation and valence was also measured, here called “tension” from tense to serene and “engagement” from indifferent to engaged (see Supplemental Table 1.) We could confirm the proposed composite dimensions suggested by Västfjäll et al.26 in a principal-component analysis in the present sample. To prevent the use of answers from non-responding participants we excluded all survey answers that had all 12 scales remaining in the middle position (neutral). (See supplementary appendix for details). The SCAS instrument was used twice, 90 minutes after the alert and at follow-up after 4–6 weeks.

2) Secondary outcomes at follow-up (after 4-6 weeks): the level of post-traumatic stress symptoms was measured using a short form self-report using 6-items28 of the PTSD checklist – civilian version (PCL-C).29 A score of ≥14 has previously been considered to indicate a clinical level of PTSD symptoms.28 The level of wellbeing
was measured by the WHO wellbeing index.\textsuperscript{30} A cut-off score of \( \leq 50 \) has previously been used when screening for depression.\textsuperscript{30} As with the SCAS instrument, the respondents who left all items at default value (three points) were excluded. (See supplementary appendix for details).

### Statistics

The twelve SCAS outcomes were summarized as composite values for alertness, pleasantness, tension and engagement and presented as means and standard deviations. The three study groups were compared by means of analysis of variance (ANOVA), where frequencies were recorded as means with standard deviations. For proportions, mean points were categorized at three levels: from 1-4 (negative values), 5 (neutral) and 6-9 (positive values). For categorical data, the Chi-square test was used. Ordinary least square (OLS) regression was used, adjusting for age, gender, profession-group, time since last CPR course, years as lay responder, acceptance rate, month of alert, place of alert and device type. Statistical analyses were performed using R, version 4.0.0.

### Ethics, informed consent

The ethics board approved the study protocol and procedures (DNR: 2019-03315). Informed consent was given online by the participating lay responders.

### Results

During the study period the lay-responder system attempted 17 816 alerts to lay responders located near suspected OHCAs. After exclusion of non-eligible as well as incorrectly executed survey answers, 8282 cases remained (Fig. 1). A total of 3411 cases answered the survey, which corresponded to 64% survey reply rate for the exposed, and 28% for the unexposed. The sample was further stratified in three groups according to level of engagement: the unexposed (Exp-0: \( n = 915 \)), the lay responders who tried but did not arrive at the scene in time (Exp-1: \( n = 850 \)), and the lay responders that reached the scene and saw the victim (Exp-2: \( n = 621 \)).

### Baseline

The two largest differences between groups at baseline was the proportion of accepted assignments during the time within the lay-responder system: Exp-0: 0.22, Exp-1: 0.66 and Exp-2: 0.68 (SMD = 0.293). The difference in mean alertness was unchanged after 4–6 weeks: Exp-0: 6.9, Exp-1: 7.5, and Exp-2: 7.4, but with lower effect size (p = 0.002, SMD = 0.226). Mean pleasantness was increased in all groups, and the difference between groups was non-significant: Exp-0: 7.3, Exp-1: 7.0 and Exp-2: 6.9 (p = 0.092, SMD 0.154) (Table 3, Fig. 2). When adjusted for potential confounders the difference in alertness and pleasantness at follow-up was non-significant. For detailed outcome per adjective pairs see Fig. 3. For adjusted analysis and proportional differences, see supplementary appendix.

### Secondary outcomes, measures at follow-up

Regarding post-traumatic stress, the difference between groups was non-significant, were the unexposed group had a higher mean score: Exp-0: 9.9, Exp-1: 8.9 and Exp-2: 8.8 (p = 0.065, SMD 0.151). A high degree of wellbeing (WHO) was seen in all three groups, and there was no difference between groups: Exp-0, Exp-1 and Exp-2 respectively: 78.0, 78.5 and 79.9 (p = 0.596, SMD 0.071) (Table 3). Measures of post-traumatic stress remained significant, and wellbeing non-significant between groups after adjustment (Supplementary Fig. 3).

### Discussion

Our results indicate that smartphone-recruited lay responders involved in resuscitation have increased emotional responses directly after the event as regards alertness, and a small decrease regarding pleasantness compared to an unexposed group of lay responders. In other words, the lay responders were highly activated (i.e., peppy, awake, active) but largely without negative emotions (i.e., sad, depressed, displeased). Negative stress would have been indicated by a high grade of alertness combined with unpleasantness, which was not the case. We interpreted the results for the exposed groups as a general adrenaline rush, due to the engagement. Although not completely comparable, dispatched lay responders in the Netherlands were asked to grade the “psychological impact” of attended resuscitation on a 3-grade scale (mild, bearable, severe).\textsuperscript{2} Soon after the event, 13% reported a severe psychological impact. The question asked by the investigators did not have a distinct positive or negative direction and could be interpreted as a composite of our two dimensions. Specifically instructed lay volunteers engaged in resuscitation in a US Public Access Defibrillation (PAD) trial were interviewed (n = 1243). They reported low mean stress levels and only four needed psychological counselling.\textsuperscript{19–20} It was not clear in what time frame the interview took place, and the volunteers had mixed levels of involvement.

Our study showed that mean values on PCL for all groups at follow-up were below cut-off for PTSD-symptomatology (\( \geq 14 \) points) proposed by Lang and Stein.\textsuperscript{28} As regards the prevalence of PTSD of 5.6% in Sweden\textsuperscript{31} the proportion with points \( \geq 14 \) among the unexposed controls was rather high. This result was unexpected and should be interpreted with caution. Firstly, there was a lower reply rate for the unexposed controls (32.2%), and secondly, there were some methodological differences. Present study used an online mixed format, not fully comparable with the cut-off for paper-and-pencil questionnaire by Lang and Stein. A third factor to take into account is the emergence of the covid-19 pandemic, which may have elevated the prevalence of PTSD in the general population.\textsuperscript{30–34} Zijlstra et al. also carried out a measure for PTSD, with use of an impact of event scale (IES). At follow-up none of the exposed subjects reported symptoms related to PTSD. The study covered 30% of all dispatched responders, and there was no comparison group.\textsuperscript{21} Scores in the wellbeing (WHO) index were high and uniform among the three groups; well over the cut-off level for clinical screen-
ing of depression (\(\leq 50\) points), and over the Swedish mean value of 64 in the general population. In the present study 98% of the respondents stated that they would act as lay responders again. This result is in line with an interview study of Swedish CPR-educated respondents who stated that they would act as lay responders again. This might relate to the methods used in prior studies. Most although all groups had fully 2 years of experience, the exposed groups had generally higher proportions of accepted assignments than the unexposed group, which could be a sign of a higher willingness to act. Very similar results at two time points regarding acceptance were prepared to perform CPR again. Bystanders were 99.5% of those who had made a resuscitation attempt were prepared to perform CPR again.

In summary, these results indicate a largely willing and dedicated crowd of volunteers. The difference between exposed and unexposed was small and likely clinically irrelevant. The data supports the formation of the unexposed control group, we took advantage of the methods used in prior studies. Most often a respondent has been asked to recall a critical, negative or unsuccessful event that made a psychological impact. Another factor related to the development of stress disorders over time could lie in the aggregated number of exposures to critical events. Hence there is a need for longitudinal studies of lay volunteers who often respond to alerts.

There are several strengths of the present study. This was a prospective comparison study where exposed and unexposed responders were allocated in a naturalistic real-world setting. For the formation of the unexposed control group, we took advantage of a technical "error", as it was assumed not to be systematic or subjectively executed, although not completely random. Recent studies have shown good compliance with self-reports administered to mobile devices, and increased reply rates as well as completion rates at follow-up for mobile phone and SMS-link web survey systems. The SMS sent to smartphones with a link to an online questionnaire, likely contributed to close-in-time replies, as well as good reply rates for the exposed groups. The self-reporting SCAS instrument was selected so as not to bias the respondent in either a negative or positive direction, since the majority of prior studies have been biased as regards both negative events and negative emotions, as also pointed out by Riegel et al. as a limitation to the PAD study.

Limitations: The lay-responder system was paused as a result of the Covid-19 outbreak, which meant that the inclusion period was limited, thereby lowering the follow-up power (see supplemental

**Table 1 – Baseline of full sample.**

<table>
<thead>
<tr>
<th></th>
<th>Overall</th>
<th>Exp-0</th>
<th>Exp-1</th>
<th>Exp-2</th>
<th>p</th>
<th>SMD</th>
<th>Missing</th>
</tr>
</thead>
<tbody>
<tr>
<td>n</td>
<td>2386</td>
<td>915</td>
<td>850</td>
<td>621</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Place of alert = VGR Region (%)</td>
<td>1166 (48.9)</td>
<td>467 (51.0)</td>
<td>393 (46.2)</td>
<td>306 (49.3)</td>
<td>0.127</td>
<td>0.064</td>
<td>0.0</td>
</tr>
<tr>
<td>Age (mean (SD))</td>
<td>41.62 (12.16)</td>
<td>43.29 (12.76)</td>
<td>40.87 (11.91)</td>
<td>40.19 (11.29)</td>
<td>&lt;0.001</td>
<td>0.171</td>
<td>0.3</td>
</tr>
<tr>
<td>Gender = Male (%)</td>
<td>1129 (47.4)</td>
<td>441 (48.2)</td>
<td>369 (43.5)</td>
<td>319 (51.6)</td>
<td>0.007</td>
<td>0.108</td>
<td>0.3</td>
</tr>
<tr>
<td>Accept prop (%)</td>
<td>0.50 (0.35)</td>
<td>0.22 (0.26)</td>
<td>0.66 (0.28)</td>
<td>0.68 (0.26)</td>
<td>&lt;0.001</td>
<td>0.165</td>
<td>0.0</td>
</tr>
<tr>
<td>Fire, Police, Security</td>
<td>199 (8.5)</td>
<td>74 (8.3)</td>
<td>59 (7.1)</td>
<td>66 (10.8)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Health Worker</td>
<td>808 (34.6)</td>
<td>320 (36.0)</td>
<td>253 (30.4)</td>
<td>235 (38.3)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>1327 (56.9)</td>
<td>495 (55.7)</td>
<td>520 (62.5)</td>
<td>312 (50.9)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Latest CPR course = within last year (%)</td>
<td>1711 (71.9)</td>
<td>663 (72.5)</td>
<td>594 (70.0)</td>
<td>454 (73.5)</td>
<td>0.305</td>
<td>0.051</td>
<td>0.3</td>
</tr>
<tr>
<td>Years as lay responder (mean (SD))</td>
<td>2.17 (1.19)</td>
<td>2.17 (1.20)</td>
<td>2.10 (1.14)</td>
<td>2.25 (1.26)</td>
<td>0.040</td>
<td>0.089</td>
<td>0.0</td>
</tr>
<tr>
<td>Accept prop (mean (SD))</td>
<td>0.50 (0.35)</td>
<td>0.22 (0.26)</td>
<td>0.66 (0.28)</td>
<td>0.68 (0.26)</td>
<td>&lt;0.001</td>
<td>0.165</td>
<td>0.0</td>
</tr>
<tr>
<td>User county = VGR Region (%)</td>
<td>1120 (48.7)</td>
<td>444 (50.6)</td>
<td>378 (46.0)</td>
<td>298 (49.4)</td>
<td>0.159</td>
<td>0.060</td>
<td>3.5</td>
</tr>
<tr>
<td>AED owner = Yes (%)</td>
<td>680 (28.5)</td>
<td>262 (28.6)</td>
<td>222 (26.1)</td>
<td>196 (31.6)</td>
<td>0.073</td>
<td>0.080</td>
<td>0.0</td>
</tr>
<tr>
<td>Device type = iOS (%)</td>
<td>1525 (64.0)</td>
<td>499 (54.6)</td>
<td>590 (69.4)</td>
<td>436 (70.4)</td>
<td>&lt;0.001</td>
<td>0.221</td>
<td>0.1</td>
</tr>
</tbody>
</table>

**Footnotes:** VGR region = Vastra Gotaland Region, Years as lay responder = years since first registered within the Heartrunner system, Profession = status registered in the application settings by the lay responder, Accept prop = proportion of accepted alerts during years as registered lay responder, User county = the registered residence of the lay responder, AED owner = status registered in the application settings by the lay responder, can either be an AED placed at a working place, or a personally owned AED.

**Table 2 – Outcome, full sample.**

<table>
<thead>
<tr>
<th></th>
<th>Exp-0</th>
<th>Exp-1</th>
<th>Exp-2</th>
<th>p</th>
<th>SMD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Full period, n</td>
<td>915</td>
<td>850</td>
<td>621</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alertness, mean (SD)</td>
<td>6.7 (1.9)</td>
<td>7.3 (1.6)</td>
<td>7.5 (1.7)</td>
<td>&lt;0.001</td>
<td>0.293</td>
</tr>
<tr>
<td>Pleasantness, mean (SD)</td>
<td>6.5 (2.0)</td>
<td>6.3 (1.7)</td>
<td>6.1 (1.8)</td>
<td>&lt;0.001</td>
<td>0.148</td>
</tr>
<tr>
<td>Engagement, mean (SD)</td>
<td>7.3 (1.5)</td>
<td>7.7 (1.3)</td>
<td>7.7 (1.3)</td>
<td>&lt;0.001</td>
<td>0.173</td>
</tr>
<tr>
<td>Tension, mean (SD)</td>
<td>7.1 (1.8)</td>
<td>6.3 (2.1)</td>
<td>6.5 (2.0)</td>
<td>&lt;0.001</td>
<td>0.277</td>
</tr>
</tbody>
</table>

**Footnotes:** Abbreviations, SD = standard deviation.
Fig. 2 – Plot of crude mean values of the two dimensions alertness and pleasantness. Rating points are between 1-9, where 5 points indicate “neutral”. Neutral value is marked with dotted lines. Arrows on y- and x-axis indicate increasing value of opposite words for alertness and pleasantness respectively (see Fig. 3). Measures directly after the mission (circle) and at follow-up after 4-6 weeks (triangle) for the three groups. Blue: unexposed (Exp-0), light brown: tried to reach the scene (Exp-1), and brown: reached the scene (Exp-2).

Table 3 – Follow up, sample from 2020-01-09.

<table>
<thead>
<tr>
<th>Sample from 2020-01-19</th>
<th>Exp-0</th>
<th>Exp-1</th>
<th>Exp-2</th>
<th>p</th>
<th>SMD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Follow up, n (%)</td>
<td>168 (32.2)</td>
<td>190 (44.0)</td>
<td>170 (54.1)</td>
<td>0.002</td>
<td>0.226</td>
</tr>
<tr>
<td>Alertness, mean (SD)</td>
<td>6.9 (1.8)</td>
<td>7.5 (1.6)</td>
<td>7.4 (1.5)</td>
<td>0.092</td>
<td>0.154</td>
</tr>
<tr>
<td>Pleasantness, mean (SD)</td>
<td>7.3 (1.6)</td>
<td>7.0 (1.6)</td>
<td>6.9 (1.6)</td>
<td>0.038</td>
<td>0.157</td>
</tr>
<tr>
<td>Engagement, mean (SD)</td>
<td>7.4 (1.5)</td>
<td>7.8 (1.3)</td>
<td>7.8 (1.3)</td>
<td>0.038</td>
<td>0.157</td>
</tr>
<tr>
<td>Tension, mean (SD)</td>
<td>7.3 (1.7)</td>
<td>6.8 (2.1)</td>
<td>7.0 (1.9)</td>
<td>0.036</td>
<td>0.185</td>
</tr>
<tr>
<td>PCL-C, mean (SD)</td>
<td>9.9 (5.0)</td>
<td>8.9 (4.4)</td>
<td>8.8 (4.6)</td>
<td>0.065</td>
<td>0.151</td>
</tr>
<tr>
<td>PCL-C &gt;14, n (%)</td>
<td>33 (19.6)</td>
<td>20 (10.5)</td>
<td>22 (12.9)</td>
<td>0.041</td>
<td>0.171</td>
</tr>
<tr>
<td>WHO, mean (SD)</td>
<td>78.0 (16.9)</td>
<td>78.5 (17.6)</td>
<td>79.9 (17.2)</td>
<td>0.596</td>
<td>0.071</td>
</tr>
<tr>
<td>WHO &lt; 50, n (%)</td>
<td>15 (8.9)</td>
<td>14 (7.4)</td>
<td>13 (7.6)</td>
<td>0.848</td>
<td>0.038</td>
</tr>
<tr>
<td>Contin. as lay responder, n (%)</td>
<td>165 (98.8)</td>
<td>189 (99.5)</td>
<td>166 (97.6)</td>
<td>0.314</td>
<td>0.105</td>
</tr>
</tbody>
</table>

Footnotes: Abbreviations, SD = standard deviation, PCL-C = Posttraumatic stress syndrome (PTSD) checklist – civilian version, 6 items, WHO = WHO wellbeing index, 5 items.
Fig. 5, Table 2). Potential confounders investigated had low predictive values. Unknown factors, seasonal bias, as well as the impact of previous alerts and the Covid-19 outbreak cannot be ruled out. Socio demographic factors has not been investigated. The use of an online slider scale has been discussed, and may have introduced some systematic error. The default setting of the handle was placed in the middle of the bar, which resulted in a difficulty to distinguish responders from non-responders. We therefore had to exclude cases that had all values unmoved. Nevertheless, all groups were subject to the same preconditions, so this does not fully explain the large differences. It is possible that those in the unexposed group were less interested in answering, as also reflected in the survey reply rate. Causality cannot be established, since the study was not as fully controlled as a randomized controlled study. A cautious approach should be applied when generalizing to different systems and demographic settings.

Conclusions

Laypersons responding to smartphone alerts for dispatch to suspected OHCAs rated the experience as high-energy and mainly positive. No harm to lay responders was seen. The responding groups had low posttraumatic stress scores, and high-level general well-being at follow-up.

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Disclosures

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Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.resuscitation.2021.11.005.

REFERENCES


