

■ Effectiveness of a combined surf and psychological preventive intervention with children and adolescents in residential childcare: A randomized controlled trial

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Abstract

Children and adolescents living in residential childcare have a higher prevalence of mental health problems as a result of a history of adverse childhood experiences. Therefore, this population should be a priority target for mental health preventive interventions. The current study analyses the effectiveness of the *Wave by Wave* surf therapy program, that combines surfing with a psychological group intervention, through a randomized controlled trial. Seventy-three youth (7-17 years) living in residential care participated in the study. Main mental health outcomes (adjustment problems, depression, anxiety, and wellbeing) and secondary outcomes (self-efficacy, self-regulation, sleep quality, physical activity, pro-social behavior, and social connectivity) were assessed at pre- and post-intervention. The results indicated a significant impact of the intervention on mental health outcomes reported by the key residential worker, with medium to large effect sizes. Specifically, after the intervention, there was a significant reduction in the total emotional and behavioural problems, and a significant increase of youth pro-social behaviour and quality of life that was not observed for the waiting list group. There were no significant effects on other measures reported by the children (e.g., depression and anxiety, self-esteem, emotion regulation, social connectedness, sleep quality, physical activity) and on executive functions measures. The *Wave by Wave* program seems to be an effective intervention to reduce behavior problems and to promote pro-social behavior in a high-risk sample. The absence of significant effects on other dimensions may indicate the need of some complementary support to address specific difficulties of this population.

Keywords: Preventive Intervention; Surf Therapy; Children and Adolescents; Residential Care; RCT.

Resumen

Efectividad de una intervención preventiva psicológica y de surf combinada con niños y adolescentes en cuidado residencial: Un ensayo controlado aleatorizado. Los niños y adolescentes que viven en acogimiento residencial tienen una mayor prevalencia de problemas de salud mental. Por lo tanto, esta población debe ser un objetivo prioritario para las intervenciones preventivas de salud mental. El estudio actual analiza la efectividad del programa *Wave by Wave*, que combina el surf con una intervención psicológica grupal, a través de un ensayo controlado aleatorio. Setenta y tres jóvenes (7-17 años) que viven en acogimiento residencial participaron en el estudio. Los principales resultados de salud mental (problemas de ajuste, depresión, ansiedad y bienestar) y los resultados secundarios (autoeficacia, autorregulación, calidad del sueño, actividad física, comportamiento prosocial y conectividad social) se evaluaron antes y después de intervención. Los resultados indicaron un impacto significativo de la intervención sobre los resultados de salud mental reportados por el cuidador en la residencia. Específicamente, después de la intervención, hubo una reducción significativa en los problemas emocionales y conductuales totales, y un aumento significativo del comportamiento prosocial de los jóvenes y de la calidad de vida que no se observó en el grupo control. No hubo efectos significativos en otras medidas reportadas por los niños (ex., depresión y ansiedad, autoestima) y en las medidas de las funciones ejecutivas. El programa *Wave by Wave* parece ser una intervención efectiva para reducir los problemas de comportamiento y promover el comportamiento prosocial en una muestra de alto riesgo. La ausencia de efectos significativos en otras dimensiones puede indicar la necesidad de algún apoyo complementario para abordar las dificultades específicas de esta población.

Palabras clave: Intervención preventiva; terapia de surf; niños y adolescentes; RCT.

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In Portugal today, a significant percentage of young people are still removed from their families and placed in residential childcare. In 2017, 7,553 children and adolescents from 0 to 20 years were living in residential and foster care, with the majority of them living in residential shelters for children and adolescents (87%) (Instituto da Segurança Social, 2018).

Most of these young people have been exposed to experiences of maltreatment and/or neglect, accumulating risk for diverse negative mental health and developmental outcomes. Usually, the child is removed from the family for a significant period, and although there is concern not to disrupt the continuity of relations with the significant others within the family, the child remains in the institution as long as the danger to his or her development and health is considered to exist. In Portugal, the most frequent duration of this residential care is between two to three years, with a mean duration of 3.60 years (Instituto da Segurança Social, 2018).

There are two main possible sources of adversity that youth in residential childcare are exposed to (Clausen, Landsverk, Ganger, Chadwick, & Litrownik, 1998). First, the negative experiences of maltreatment and neglect that were the main reason for their placement in institutionalized care. In a study by Collin-Vézina, Coleman, Milne, Sell, and Daigneault (2011), all the children and adolescents reported having experienced some level of physical neglect (98%), emotional abuse (68%), physical abuse (60%), emotional neglect (58%) and/or sexual abuse (38%). More than half of the sample reported all or almost all of these different kinds of abuse and neglect. Secondly, the chronic stress that is associated with these experiences is prolonged in time and does not disappear with institutionalization. Separation from families and the process of institutionalization itself also constitutes a source of stress. According to youth living in residential childcare, there were factors related with the institutionalization that contributed to their mental health problems, including feeling disconnected from their families, feelings of being imprisoned, feeling disrespected or devalued, and the environment of conflict (Arsenault & Domene, 2018).

These different risks act together making these youngsters more vulnerable to mental health problems that can persist even after leaving residential childcare (Lehmann, Havik, Havik, & Heiervang, 2013; Oswald, Heil, & Goldbeck, 2010; Washington et al., 2018). Previous literature shows a high prevalence of mental health problems in children and adolescents in residential childcare (Campos, Barbosa-Ducharne, Dias, Rodrigues, Martins, & Leal, 2019; Tavares-Rodrigues, González-García, Bravo, & Del Valle, 2019).

Recent research, conducted with Portuguese adolescents, observed that adolescents living in residential childcare reported significantly more behavioral and emotional problems than adolescents living with their families (Campos et al., 2019).

Therefore, it is imperative to intervene with these youngsters to prevent mental health problems and to increase their wellbeing. These interventions should be informed by evidence, targeting protective and risk factors for healthy development. A review conducted by Zabern and Bouteyre (2017) points out specific protective factors that can be targeted by mental health preventive interventions, including positive self-esteem, participation in after-school activities, access to social support and a warm, stable and predictable environment.

There is a scarcity of interventions designed to promote mental health in this specific population. To best of our knowledge there is only one program that revealed a significant impact on the mental health of youth in residential childcare (Taussing & Culhane, 2010). This program consisted of a manualized skills groups with a cogni-

tive behavioral approach implemented during 30 weekly group sessions and one to one mentoring of 2 to 4 hours of individual time each week. Although this program revealed promising effects on the mental health of these young people, it involved a lot of resources due to the duration and intensity of the intervention.

The Wave by Wave program

The *Wave by Wave* program is a preventive intervention that combines surfing with psychological intervention. The program is based on resilience research (Masten, 2014), targeting several processes that protect children at risk from a deviant trajectory. The main objectives of the program are to decrease mental health problems and increase wellbeing through the promotion of different protective factors, such as self-esteem, self-regulation, healthy habits (physical activity and less sedentarism), social, and communication skills and positive connections with peers and adults.

Wave by Wave was devised as an alternative, less stigmatizing, psychoeducational intervention that includes several important components: physical activity (surfing) in a natural setting, a stable and predictable environment and a sensitive and responsive social context that promotes youth self-regulation.

Concerning the first component, there is some evidence that physical activity has benefits for physical and psychosocial health outcomes. Marker, Steele and Noser (2018) reviewed 19 intervention studies whose results suggest small to medium positive effects on the health-related quality of life of children and adolescents. Additionally, there is some evidence that activities that involve direct contact with nature can have a positive impact on human cognitive function and mental health (Bratman, Hamilton, & Daily, 2012).

Secondly, the activities are presented in a structured and planned way through weekly three-hour sessions with the same format to give the participants a sense of stability and predictability. The sessions run throughout the school year and each child is integrated in a group where facilitators and participants are consistent throughout the year. Offering a stable and predictable environment is particularly important for youth that have experienced (and in some cases continue to experience) stressful and unpredictable events that have contributed to their sense of powerlessness.

Learning to surf and surfing pose significant challenges for youngsters, exposing them to controlled risk where they can experience some intense emotions (anxiety, frustration, joy, etc.). Having adults that respond to these emotions in a sensitive way, helping them to regulate these emotions (e.g. helping them to identify the emotions and to express them in appropriate ways) is another important aspect of the program. When the participants accomplish their objectives and experience the mastery of these emotions and challenging activities, this impacts their self-confidence. Likewise, there are specific moments in the sessions where the youngsters are encouraged to share their in- and out-group experiences. These moments help to develop communication skills (to express themselves without aggression, to hear in an empathic way) and confidence among all participants.

A study of the impact of a shorter version of the *Wave by Wave* program (8 sessions) was conducted with 48 adolescents aged 10 to 16 (Gaspar et al., 2017). The program consisted of twice-weekly sessions, each with duration of four hours during the school summer holiday. This study showed positive results in different mental health outcomes, specifically reducing externalizing problems reported by the youth and an improvement in internalizing and externalizing problems by the key residential worker. Nevertheless, this study was conducted with a briefer version of the *Wave by Wave* program and

the single group intervention design did not allow a more robust evidence of the program's effectiveness.

The current study is the first randomized controlled trial conducted to examine the effectiveness of the *Wave by Wave* intervention in reducing emotional and behavioral problems and increasing wellbeing in youth in residential childcare. A further objective of this study was to explore the impact of the *Wave by Wave* intervention in several dimensions that are potential protective factors, including individual factors (self-esteem, emotion regulation, behavioral and attentional regulation, sleep quality and physical activity) and relational factors (pro-social behavior and social connectivity). Finally, another aim was to evaluate aspects related to the intervention process, such as the fidelity of intervention implementation.

Method

Design and recruitment

This study used a randomized controlled trial, with two groups (intervention and waiting-list group) and two waves of data collection (pre- and post-intervention).

Participants

The sample of this study consisted of eighty-nine Portuguese children and adolescents living in institutions as a temporary response, and their respective key residential worker. Ages ranged from 7 to 17 ($M = 13.83$; $SD = 2.60$), 52 (58.40%) were male and 37 (41.60%) female. On average, children had been in residential care for about 42 months ($M = 42.59$; $SD = 34.84$) and the majority (58.40%) had been in the same institution since the first placement. Of the children, 33 (37.10%) had siblings at the same institution and 58 (65.20%) had weekly contact with at least one family member.

Measures

Socio-demographic and Institutionalization information was collected from the key residential worker at the residential youth care institution. The information included children's gender, age, years of placement in institutional care, frequency of family contact, medical or psychological support (if applicable) and psychopharmacology (if applicable). Additional school information was also collected.

Main Outcomes: Externalizing problems, Internalizing problem and Health-Related Quality of Life

The *Strengths and Difficulties Questionnaire* (SDQ; Goodman, 1997) is a widely validated measure of behavior and emotional problems. The SDQ behavior and emotional problems comprises 20 items which are rated on a 3-point Likert scale. Higher scores on that scale correspond to more emotional and behavioral difficulties. The Portuguese version of the Strengths and Difficulties Questionnaire for children and caregivers was used in the current study (Fleitlich, Loureiro, Fonseca, & Gaspar, 2005). The internal consistency study revealed acceptable consistency for the SDQ total scale (self-report $\alpha = .69$ pre-test, $.84$ posttest; other-report $\alpha = .85$ pre-test, $.83$ posttest).

The *Revised Children's Anxiety and Depression Scale* (RCADS; Chorpita et al., 2000) is a 47-item youth self-report questionnaire that measures symptoms of anxiety disorders and depression in children. All items are scored on a 4-point Likert scale. Items can be summed into two major scales: (1) Total anxiety scale and (2) Major depressive disorder scale. Higher scores on both scales correspond to a higher

frequency of anxious and depressive symptomatology. The Portuguese version used in this study reveals high internal consistency for the total anxiety scale ($\alpha = .91, .93$) and major depressive scale ($\alpha = .74$ pre-test, $.86$ post-test) (Pereira & Pedro, 2018).

The *Kidscreen-10* (Ravens-Sieberer et al., 2010) is a unidimensional measure of health-related quality of life, with 10-items, rated on a 5-point Likert scale. In this study the Portuguese version of self-report and caregiver-report was used, KIDSCREEN-10 (Gaspar & Matos, 2008). Higher scores on this measure correspond to a higher health-related quality of life. Both reports reveal good internal consistency (self-report $\alpha = .75$ pre-test $.79$ posttest; other-report $\alpha = .83$ pre-test, $.85$ posttest).

Secondary Outcomes: Individual factors

The *Rosenberg Self-Esteem Scale* (RSES; Rosenberg, 1965) is a 10-item (rated on a 5-point Likert scale) unidimensional self-report measure for assessing global self-esteem. Higher scores on this scale correspond to a higher self-esteem. In this study, the Portuguese version (Pechorro, Marôco, Poiães, & Vieira, 2011) presented a high internal consistency ($\alpha = .82$ pre-test, $.88$ posttest).

The *Emotion Regulation Questionnaire for Children and Adolescents* (ERQ-CA; Gullone & Taffe, 2012) is a 10-item self-report measure for assessing emotion regulation strategies. It is composed of two scales representing adaptive and nonadaptive emotion regulation strategies, specifically, cognitive reappraisal (6 items) and expressive suppression (4 items). The items are answered on a 5-point scale. Higher scores on each scale indicate a higher frequency of use of the corresponding strategy. The Portuguese version (Teixeira, Silva, Tavares, & Freire, 2015) used in this current study showed a low internal consistency in the expressive suppression scale ($\alpha = .53$ pre-test, $.61$ posttest) and an acceptable internal consistency in the cognitive reappraisal scale ($\alpha = .75$ pre-test and $.80$ posttest). Due to the low internal consistency value of the expressive suppression scale, only the cognitive reappraisal scale was used in the current study for data analysis.

The *Test of Everyday Attention for Children* (Manly, Robertson, Anderson, & Nimmo-Smith, 1999) is a standardized battery of 9 subtests that aims to assess the multidimensional nature of the developing attention system in children and adolescents, through "game-like" tests. The psychometric properties were analyzed in previous studies, which indicate sufficient to good test-retest reliability and which support construct validity, as evidenced by significant correlations with other measures of attention (e.g. Manly et al., 1999). In the current study two subtests were used:

Walk/Don't Walk subtest measures children's sustained attention and inhibitory control. This task consists of a sheet of paper showing a path each made of 14 "flagstones". Through a tape with two different tone stimuli, participants are asked to take one step along a path when they hear a "Go" tone and mark that "flagstone" with a pen, and hold on when they hear a periodic and unpredictable "No-go" tone, not checking that "flagstone". There is a total of 20 paths and the time interval between the tone stimuli decreases as the task proceeds, increasing the difficulty of the task. The total score corresponds to the number of times the participants successfully withhold the response to the "No-go" tone, with higher scores indicating more ability to control and inhibit behavioral responses.

Opposite Worlds subtest measures children's attentional control. This subtest is composed of by two conditions in a four-trial task. In the "Same World" condition, children are asked to read aloud the digits 1 or 2 that appear in a mixed, quasi-random matrix. In the "Opposite World" condition, children are asked to do the opposite, that is,

read the digit “1” when “2” was read, and to read the digit “2” when “1” was read, as quickly as possible, suppressing the automatic verbal response. The total score corresponds to the difference between the mean time needed to complete the ‘opposite worlds’ trials and the mean time needed to complete the ‘same world’ trials.

Secondary Outcomes: Relational factors

The pro-social behavior subscale of the *Strengths and Difficulties Questionnaire* (SDQ; Goodman, 1997) was also used in the current study. The total score of 5-item subscale ranges from 0 to 10 points with higher scores on this scale corresponding to more pro-social behavior. The internal consistency study revealed acceptable consistency for pro-social behaviors (self-report $\alpha = .71$ pre-test, $.80$ posttest; other-report $\alpha = .87$ pre-test and $.80$ posttest).

The *Social Connectedness Scale-revised* (SCS-r; Lee, Draper & Lee, 2001) measures the degree of interpersonal closeness in a social network. It consists of a 20-item self-report questionnaire rated on a 6-point Likert scale. Higher scores on this scale indicate a perception of higher social connectedness. A modified version of the Portuguese SCS-r (Francisco, Crespo, Dias, Malaquias, & Rocha, 2011) was used in this study. The modifications consisted of a reduction in the number of the items from 20 to 9, with only the items with higher factorial load being retained, and with rephrasing some of the items to improve the clarity for a younger sample. The total score of this scale ranges from 9 to 54 points. The 9-item version of the SCS-r showed a high internal consistency in this study ($\alpha = .86$ pre-test and $.84$ posttest).

Other Secondary Outcomes

The *Pittsburgh Sleep Quality Index* (Buysse et al., 1989) is a self-report questionnaire used in children and adolescents, which measures the subjective sleep quality and disturbances and the impact of poor sleep on functioning (e.g. subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of sleep medication, and daytime dysfunction over the previous month). The items are summed to produce a global score - global PSQI, with higher values corresponding to poorer sleep quality. In this study, the Portuguese version (João, Becker, de Neves Jesus, & Martins, 2017) showed appropriate internal consistency for the global PSQI score ($\alpha = .80$ pre-test and $.68$ posttest).

The *Youth Activity Profile* (Saint-Maurice & Welk, 2014) is a self-report 7-day recall questionnaire designed to measure physical activity and sedentary behavior in young people. It includes items divided between 3 dimensions: activity at school; activity outside school, and sedentary behaviors. All items are rated on a 5-point Likert Scale. Considering the purposes of this study, participants were assessed in only two dimensions (10 items), activity outside school and sedentary behaviors, with higher scores corresponding to higher activity levels or sedentary habits. In the current study, only the physical activity outside school scale presented an acceptable internal consistency (physical activity outside of school scale $\alpha = .75$ pre-test, $.78$ posttest; sedentary behaviors sub-scale $\alpha = .29$ pre-test, and $.10$ posttest). Therefore, only the physical activity outside school dimension was used for data analysis.

Data Collection Procedures

Ethical approval was obtained from the ethics committee of the Faculty of Psychology of the University of Lisbon, Portugal. A list of all institutions in the metropolitan area of Lisbon was created from a government database. The Portuguese institutions that are responsible

for the care of high-risk children typically house 10 to 15 children and seek to provide an environment where children can grow safely and develop a life project. In these institutions all children and young people have an institutional caregiver who is responsible for them on a daily basis.

An initial contact with forty-four institutions was made and all details and explanations were given, including the eligibility criteria for children to participate in the project: (1) Aged between 7-17 years; (2) Being in residential care at the beginning of the study; (3) Having never participated in the *Wave by Wave* program, (4) No report of a complex developmental or mental condition and (5) No report of a condition that precluded the comprehension of assessment measures. Nineteen institutions declined participation (lack of interest in the program or did not have eligible children). Twenty-five institutions demonstrated interest in the project identifying one hundred and two children and adolescents eligible for the intervention. All eligible participants were randomly assigned, at an individual level, either to the intervention or the control condition by the first author, using a computer-generated random-number sequence before assessment.

From the one hundred and two children and adolescents eligible for the intervention, eighty-nine completed the pre-test assessment (Figure 1).

Before data collection, informed consent from the institutional caregivers and assent from the participants were collected. Pre-tests were conducted immediately prior to the beginning of the intervention by four researchers. The child measures were administered in a separate quiet room at the child’s care residence, in one or two sessions. The questions were read aloud to children with reading problems or younger children. Questionnaires were delivered to institutional caregivers and collected two weeks after.

After participating in the *Wave by Wave* program a post-test was immediately conducted for both groups, in the same conditions as the pre-test. From the initial sample, sixty-five children and adolescents completed the post-test. Twenty-four (twelve from each group) were excluded from the sample (did not begin intervention, declined to participate in the post-test, family reintegration, change of care residence) (Figure 1). Only the intervention group was exposed to the twenty-one sessions of *Wave by Wave* intervention program. Nevertheless, all children and adolescents on the waiting-list group were given the opportunity to participate in the *Wave by Wave* program after the post-test.

Intervention

The *Wave by Wave* program aims to contribute to the promotion of mental and physical health, well-being and resilience in children and adolescents at-risk living in institutions. The program occurred on Carcavelos beach (Cascais, Portugal), between January and June 2019, with an interruption for school holidays (Carnival and Easter holidays) with a total of twenty-one sessions.

The program was implemented by a multidisciplinary team of 11 members: three specialized technicians in mental health (psychologists and a psychology Master’s student), four surf instructors certified by the Portuguese Surf Federation and four volunteers with work experience with youth at risk. Throughout the program all facilitators participated in short training courses on mental health intervention on a diversity of subjects (e.g., trauma informed care, non-violent communication, crisis management). Given the critical role of surf in the intervention, facilitators also received continuous training in the practice of surfing including surf safety rules and basic surf teaching techniques.

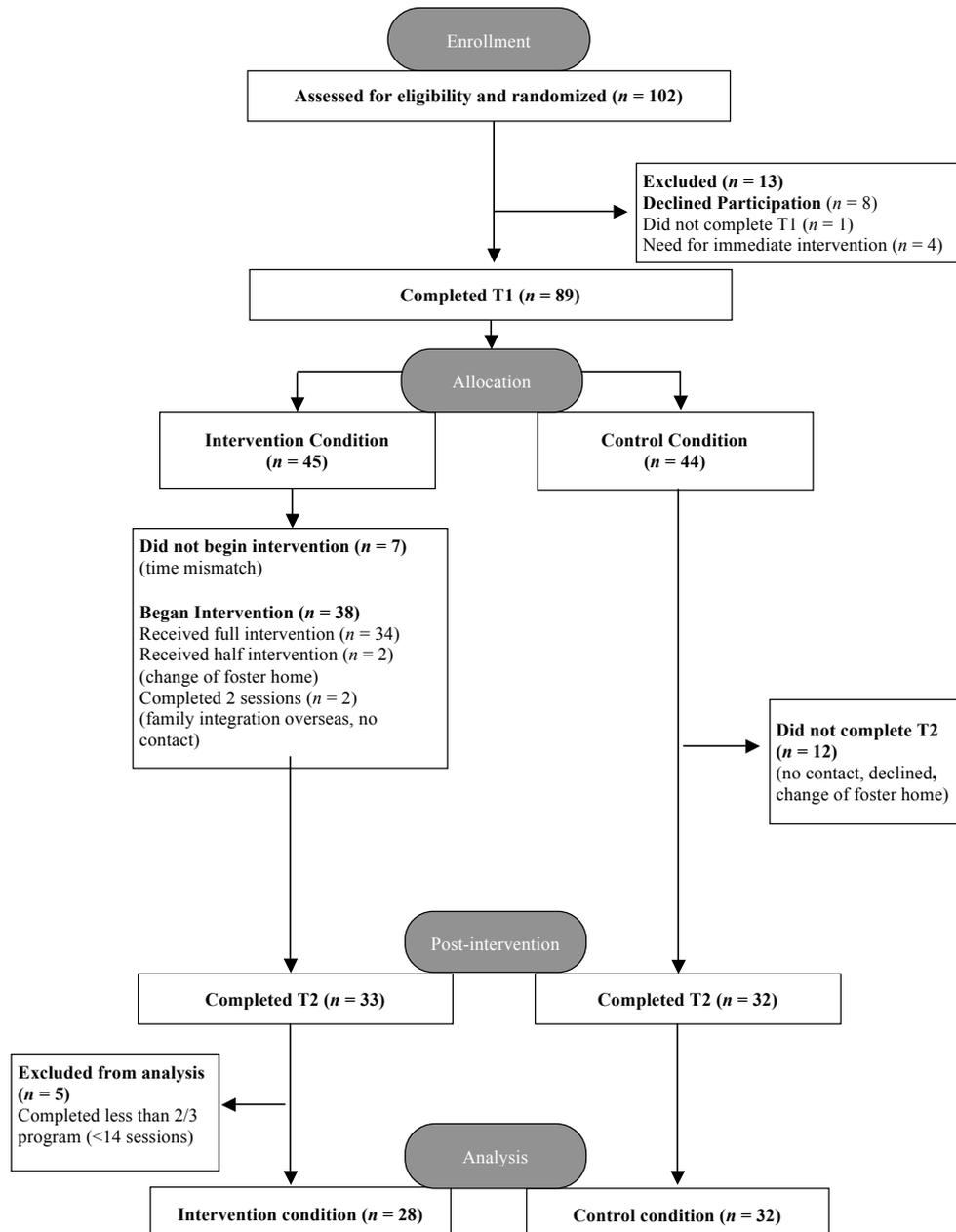


Figure 1. Flow chart of participants. T1 = Pre-intervention assessment; T2 = Post-Intervention assessment.

The program was implemented with three different groups on different weekdays. In each group the sessions were held once a week and lasted three hours. In order to preserve the group's identity and the intervention principles, every sessions of each group always took place on the same day of the week and at the same time, with the same facilitators. The number of participants per camp ranged from fourteen to seventeen and all were managed by a team of six or seven facilitators, which corresponds to an average ratio of one facilitator to every three children. At least one specialized technician in mental health and one surf instructor was required in each group.

All sessions followed the same structure and were divided into four components that complement each other and follow one of the pillars of the *Wave by Wave* intervention, predictability: (1) Initial Circle: participants and facilitators talked about the previous week and participants had the opportunity, if they so wished, to share some event, thought, or feeling. All participants and facilitators who were not present were always remembered in order to emphasize the

importance of each member of the group; (2) Group dynamic: facilitators promoted an activity or a group reflection, related to the theme of the week and with the aim of developing the socio-emotional skills defined for the session (e.g. non-violent communication, empathy, self-confidence); (3) Surf Dynamic: surfing activities suited to each participant given their level of surfing practice. More important than improving technique was the moment when participants, with the assistance of the facilitator, had to overcome the difficulties that they encountered during the activities; (4) Final Circle: participants and facilitators met again for a moment of sharing and reflection about their experiences during the session.

To ensure an intervention in accordance with the established objectives, as well as coordination and cohesion among facilitators, the team of facilitators of each group met twice a week, immediately before and after each session (to revise session goals, strategies to be used, share information about the group and the participants and their response to the session). With the purpose of ensuring con-

sistency in the interventions with the three groups, all facilitators of the *Wave by Wave* program met once a week for one hour, where the main theme and objectives of the next session were set, as well as the socio-emotional skills and surfing activities.

Statistical Analysis

Power calculations were conducted using WebPower (Zhang & Yuan, 2018) considering an effect size of 0.35, power of 0.80, sphericity of 0.70, and an alpha of 0.05. Therefore, the number of participants needed was 84. Considering and attrition of 15% (based on the work of previous studies with the program), we needed to enroll approximately 100 participants.

We conducted Chi-Square tests and *t* tests to compare the two groups' socio-demographic characteristics at baseline. We also performed similar tests to conduct attrition analysis, comparing the characteristics of the participants who remained in the study and drop-out participants. To evaluate some aspects of the implementation process, we computed the frequency and relative frequency of activities fully implemented for each session and the number of sessions attended for each participant.

Finally, to evaluate the effects of the intervention we conducted a repeated measures ANCOVA, with a within time factor (pre and post evaluation) and a condition between factor (intervention and waiting-list condition). Sex was included as a covariate as it was found that the two groups presented significant differences by sex. Following Morris's (2008) recommendation, effect size (*d*) was calculated based on the pre-post change in the treatment group means minus the pre-post change in the waiting group means, divided by the pooled pre-intervention standard deviation. An effect size of .20 represented a small effect size, an effect size of .50 was considered medium, and an effect size of .80 was considered large (Cohen, 1988).

Results

Preliminary results

The groups were equivalent at the base line as shown by the absence of significant differences between the intervention group and the waiting list group on the baseline socio-demographic characteristics and outcome measures, except for sex differences (Table 1). Therefore, analyses were adjusted for sex.

Attrition analyses

From the initial sample of participants who were enrolled in the study and who completed the pre-intervention evaluation ($n = 89$), 65 completed the study and 24 dropped out of the study. The analysis comparing these two groups showed significant differences between the groups concerning: frequency of contact with the family ($X^2(3) = 10.66, p = .014$), anxiety ($t_{(87)} = 3.02, p = .003$), social connectivity ($t_{(87)} = 2.08, p = .040$) and sleep quality ($t_{(84)} = 2.51, p = .014$). Completers had more frequent contact with their family (77.2% of completers with weekly contact; 63.6% of non-completers with weekly contact), showed significantly more anxiety (completers $M = 42.44, SD = 18.82$ vs. non-completers $M = 29.55, SD = 15.05$), poorer sleep quality (completers $M = 7.69, SD = 2.82$ vs. non-completers $M = 5.82, SD = 3.54$) and perceived themselves as more connected to others (completers $M = 39.43, SD = 9.09$ vs. non-completers $M = 34.96, SD = 8.71$).

Table 1. Demographics Characteristics of Study Sample

Demographics (n = 89)	Intervention condition (n = 45)	Waiting-list condition (n = 44)	Test Statistic ^a
Mean child age, years (SD)	13.64 (2.89)	14.02 (2.29)	-.68
Male, N (%)	31 (68.9)	21 (47.7)	4.10*
Race/Ethnicity N (%)			
Non Caucasian	5 (11.10)	8 (18.2)	.89
Education N (%)			
General Education	19 (46.3)	23 (60.5)	1.74
Special Education	16 (14.6)	5 (13.2)	
Professional Education	6 (39.0)	10 (26.3)	
First Placement in Residential Care (Mean in months) (SD)	45.75 (34.98)	39.42 (34.80)	.85
Placement at Current Residential care (Mean in months) (SD)	31.73 (32.98)	29.63 (30.21)	.31
Number of Placements N (%)			
One	24 (53.3)	28 (63.6)	.82
Two	19 (42.2)	14 (31.8)	
More than Two	2 (4.4)	2 (4.5)	
Siblings at same Residential Care N (%)	17 (37.7)	16 (36.4)	1.35
Family Contact (weekly) N (%)	33 (78.6)	25 (67.6)	1.34
Mental Health Support N (%)	30 (66.7)	26 (59.1)	.38

SD = standard deviation. a T test for continuous variables and X2 test for categorical variables. * $p < .05$

Fidelity of intervention implementation

Fidelity of implementation was assessed by the percentage of the activities fully implemented for each session. The initial circle was the most frequently completed activity in the three fields, with a 100% implementation percentage. Both, group and surf dynamics achieved high implementation percentages with values of 80% and 95% respectively. The non-implementation in the first case was generally due to participants' mood, and in the second case to weather and sea conditions. The final circle was the activity where there was a major difficulty of achievement, across all camps, with a percentage of implementation of 71%. The most frequent reasons for the non-completion of this last activity was the lack of time.

On average during the current study, participants attended eighteen sessions out of twenty-one. At least 85% of the participants attended 14 sessions (2/3 of the sessions) and most of the participants (54.6%) completed between 18 to 20 sessions. The most frequent reasons for nonattendance were: school events (examinations and school excursions), medical appointments, illness, missed transportation and lack of motivation.

Effect of intervention

Only the participants who attended at least 14 sessions (2/3 of the sessions) were included in the analyses. Short-term effects of the intervention are presented in Table 2.

Table 2. Intervention effects on participants outcomes: mean and standard deviation of pre and posttest in the intervention and wait-list condition, results of repeated measures ANCOVA and Cohen's d

Measure	Intervention condition		Waiting-list condition		Interaction effect <i>F</i> (1,57)	Cohen's <i>d</i>
	M (SD) <i>n</i> = 28		M (SD) <i>n</i> = 32			
	Pre-test	Post-test	Pre-test	Post-test	<i>F</i> (1,57)	
SDQ Total	14.37 (5.45)	14.66 (7.27)	13.54 (4.99)	13.77 (6.80)	0.00	0.01
RCDAS Anx.	40.23 (17.80)	38.25 (20.86)	46.21 (18.91)	39.30 (20.84)	0.76	0.26
RCDAS Depr.	7.65 (5.60)	8.19 (6.55)	9.37 (5.48)	8.63 (6.94)	1.13	0.23
KIDSCREEN	38.70 (5.24)	38.09 (6.80)	36.22 (6.10)	36.37 (7.05)	0.04	-0.13
RSES	27.78 (5.67)	29.61 (6.71)	23.89 (8.70)	26.39 (9.30)	0.25	-0.09
ERQ-CA	20.93 (4.90)	21.42 (4.98)	20.22 (4.58)	21.76 (4.33)	1.23	-0.21
SDQ ProSoc	8.16 (1.70)	8.31 (2.35)	8.29 (2.10)	8.14 (1.85)	1.33	0.15
SCS-r	40.89 (7.45)	39.89 (8.82)	38.37 (9.93)	39.23 (8.09)	0.91	-0.21
Sleep Quality	7.64 (2.98)	5.21 (3.69)	7.69 (2.83)	5.50 (2.84)	0.42	-0.08
Physical Act.	1.41 (0.82)	1.53 (1.03)	1.41 (0.98)	1.46 (1.00)	0.00	0.07
Walk/Don't	10.04 (5.41)	12.54 (3.98)	12.68 (3.03)	13.81 (3.47)	2.07	0.31
Oppo. Worlds	8.32 (7.16)	9.00 (5.71)	6.34 (4.09)	6.19 (3.95)	0.38	0.14
SDQ Total Caregivers	18.73 (6.47)	15.28 (5.85)	14.26 (7.52)	15.24 (7.28)	6.11*	-0.62
KIDSCREEN Caregivers	31.39 (7.58)	36.23 (5.25)	33.71 (6.10)	33.97 (6.36)	4.47*	0.66
SDQ ProSoc. Caregivers	5.11 (2.57)	6.48 (2.01)	7.48 (2.12)	6.56 (2.28)	9.85***	0.97

SDQ Total = Strengths and Difficulties Questionnaires - Total Scale; RCDAS Anx = Revised Children's Anxiety and Depression Scale - Anxiety Scale; RCDAS Depr = Revised Children's Anxiety and Depression Scale - Depression Scale; RSES = Rosenberg's Self-Esteem Scale; ERQ-CA = Emotion Regulation Questionnaire for Children and Adolescents; SDQ ProSoc = Strengths and Difficulties Questionnaires - Prosocial Scale; SCS-r = Social Connectedness Scale-revised; Physical Act = Physical Activity scale; Oppo. Worlds = Opposite Worlds; SD = standard deviation.
* $p < .05$; *** $p < .001$

The effectiveness of the intervention was tested with the interaction between the intervention condition and time in each analysis. All the effects were adjusted for participants' sex. As the RCDAS Depression and SDQ Prosocial self-report scores violated the assumption of normality, a log transformation of the scores was applied.

Child report measures

Using the child reported measures and the performance tests there were no significant interaction effects between time and condition factors indicating an absence of effects of the intervention.

Caretaker report measures

Finally, for the caretaker reported measures we found significant (moderate to high) interaction effects for all the measures. At the post-test children in the intervention group were more likely to present a reduction in the emotional and behavioral problems, and more likely to show an increase in prosocial behavior and well-being, compared to the waiting-list group.

Discussion

Children and adolescents living in residential care have a higher prevalence of psychological problems and negative developmental outcomes as a result of a history of negative life events and the accumulation of adversities (Clausen et al., 1998; Rodrigues et al., 2019). Therefore, this is a high-risk population that should be a priority target for mental health preventive interventions. The current study examined the effectiveness of a combined surf and psychological preventive intervention for youth in residential care.

The *Wave by Wave* program is a group preventive intervention that combines surf with a psychological intervention targeting several protective factors that promote mental health. Previous studies using one group pre-and post-test design showed positive results of a shorter version of this program, specifically the reduction of externalizing problems (self-report and caretaker report) and internalizing problems (only caretaker report) (Gaspar et al., 2017). The current study is the first randomized controlled trial conducted to study the

effectiveness of the *Wave by Wave* program. Mental health outcomes and well-being and different individual and relational protective factors were evaluated through multiple informants (child/adolescents, key residential worker) and methodologies (self-report, other-report scales, performance tests).

One first result that it is important to emphasize is the high level of completion of the program. The drop-out of the intervention was very low ($n = 4$) and on average participants attended eighteen out of twenty-one sessions. This is an impressive result taking into consideration that the drop-out rates in mental health services are usually high (Pellerin, Costa, Weems, & Dalton, 2010). Some practical factors may have promoted this high participation in the program (e.g. the transportation from the foster institution to the beach), but there are also motivational factors involved, with the youngsters usually manifesting their will to participate in the activities. The fact that the intervention consists of a pleasurable group activity with adults trained to respond in a sensitive way to children that can be behaviorally challenging are probable causes for the high adherence of the participants.

Regarding the impact of the program, the results show a significant positive effect in several outcomes reported by the key residential worker. These results are in line with the results of the previous study of the short version of the *Wave by Wave* program that revealed more significant impact of the intervention in the key residential worker report of adjustment difficulties compared to the youth self-report (Matos et al., 2017). At the post-test the current study shows that the intervention group was more likely to show a reduction in adjustment problems, and more likely to present an increase in well-being and in prosocial behaviors, compared to the waiting-list group. This last result is particularly important considering that these youngsters are more at risk of developing a deviant and anti-social trajectory (Pears, Kin, & Fisher, 2016). Several characteristics of the intervention may contribute to this result including the fact that the intervention is in a group format and that social competencies, group cohesion and non-violent interaction are targeted during the whole intervention.

The intervention did not show significant effects in any of the outcomes reported by the children or adolescents. It is important to consider that the child's self-report concerning mental health outcomes was more favorable in all the measures than the mental health outcomes reported by the key residential worker. A study conducted by Goodman, Ford, Corbin and Meltzer (2004) with children in foster and residential care concluded that the reliance just on self-reports would successfully identify about half of the emotional/internalizing disorders, but would miss the great majority of behavioral/externalizing problems. Therefore, one of the hypotheses for the absence of effects on youth outcomes was the underreporting of problems. Also, the fact that most of the participants were male and that internalizing problems are more prevalent in females, especially in adolescence (Wartberg, Kriston, & Thomasius, 2018), could also explain why initial mean levels of anxiety and depression were not higher, leaving less room for improvement.

In addition, we also need to consider that, in some cases where the participants presented higher levels of internalizing and mental health problems, this kind of intervention is not sufficient and should be seen as a complement to a more intensive psychological intervention targeting specific psychological problems.

Concerning the other dimensions (self-regulation, self-esteem, sleep quality, physical activity) there were slight improvements in the intervention group, but not significantly different from the waiting-list group. There was also no impact of the intervention on the interpersonal closeness of the social network perceived by the children and

adolescents. Although one of the main purposes of the intervention was to increase the sense of positive connection with peers and adults, this objective appears not to have been accomplished. The fact that the groups were composed of a high number of children, preventing a more individualized approach to the participants, and that there were some unpredictable changes in the compositions of groups (in terms of the participants and facilitators) during the intervention may have contributed to this result.

It is worth mentioning several shortcomings in the current study. First, despite randomization, the two intervention and waiting-list groups presented significant differences in relation to sex. We tried to overcome this limitation by controlling the effect of child's sex in the analyses. However, this fact makes it harder to generalize the study findings to a more balanced sample in terms of gender composition. Second, the waiting-list group was not exposed to an alternative intervention. Therefore, other factors than the *Wave by Wave* program may explain the results in the intervention group (e.g. weekly physical activity; more time of attention from significant adults). In future, the effectiveness of the *Wave by Wave* program should be further explored, through the inclusion of a comparison group exposed to an alternative intervention. Third, the size of our sample, as well as the scarcity of literature on the field, constrained the ability to perform more sophisticated, and recommended, statistical analyses, such as robust linear mixed effects models (LME) or generalized estimating equations (GEE). Both would account for the skewed data, but as for LME, a random slopes model would have resulted in inflated level-2 errors (e.g., McNeish & Stapleton, 2016); while for GEE, literature scarcity would not contribute providing a sound theory-driven resolution to specify the residual correlation matrix (e.g., Muth, Bales, Hinde, Maninger, Mendoza, & Ferrer, 2015). Fourth, the fact the study was conducted in a relatively restricted geographical area may also limit the generalizability of the results. Fifth, none of the informants were blind to the participants' conditions. This may have influenced the results, especially concerning self-report and other report measures, introducing some bias attributed to the knowledge that some children participated in the intervention and other did not. Also, the fact that there was not a follow-up assessment may have prevented measurement of some sleeper effects or prevented us from knowing if the positive effects found can be sustained at the long-term.

Despite the limitations, this study indicates that the *Wave by Wave* program is a potential preventive intervention with some clear benefits, especially concerning its capacity to maintain the youngsters involved in a positive group activity and with some potential to attain positive changes in behavioral and well-being domains. Future studies, with more complex statistical analyses, are needed to explore this program with other samples (e.g. non-urban, female) and to study long-term results of the intervention.

Conflict of interests

The author(s) of this paper state that there is no conflict of interest.

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