

Feasibility and Effect of Adding a Concurrent Parental Component to a School-Base Wellness Program Using Two Modes of Mobile-Based Technology – Mixed Methods Evaluation of RCT

Moria Golan (✉ moria.golan@mail.huji.ac.il)

Tel Hai Academic College

Shakked Benifla

Tel Hai Academic College

Aviv Samo

Tel Hai Academic College

Noa Alon

Tel Hai Academic College

Maya Mozeikov

Tel Hai Academic College

Research Article

Keywords: School-based, Prevention, Self-esteem, Body esteem, Mobile application

Posted Date: September 17th, 2021

DOI: <https://doi.org/10.21203/rs.3.rs-618752/v1>

License:  This work is licensed under a Creative Commons Attribution 4.0 International License.

[Read Full License](#)

Version of Record: A version of this preprint was published at BMC Public Health on February 14th, 2022.
See the published version at <https://doi.org/10.1186/s12889-022-12581-7>.

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25

Feasibility and Effect of Adding a Concurrent Parental Component to a School-Base Wellness Program Using Two Modes of Mobile-Based Technology – Mixed Methods Evaluation of RCT

Moria Golan^{1,2}, Shakked Benifla¹, Aviv Samo¹, Noa Alon¹, Maya Mozeikov¹

¹ Department of Nutritional Sciences, Tel Hai Academic College, Kiryat Shmona, Israel

² Shahaf, Community-based body image and eating disorders facility, Israel

Corresponding author:

Prof. Moria Golan, moria.golan@mail.huji.ac.il

Abstract

Background: This study assessed the feasibility and effect of two mobile modes (WhatsApp vs. a specially designed app) in their delivery of updates and assignments to parents.

Methods: Two three-armed, randomized, controlled feasibility studies were conducted. Participants were randomly allocated to the control arm, youth-only arm, or youth & parental component arm. In the parental component, parents received updates and were requested to complete shared assignments with their children. In the first year, the assignments were sent through WhatsApp and in the following year via the specially designed smartphone application. Students and parents filled out questionnaires at three measure points: pre and post intervention and at three months follow-up. Mixed-methods assessments were performed using semi-structured interviews with parents and school staff members, as well as a computerized self-report questionnaire.

Results: The addition of the concurrent parental component via WhatsApp was associated with superior improvement in self-esteem and identification of advertisement strategies, compared with

26 the youth-only program. However, adolescents in the youth-only program delivered via the
27 specially designed application demonstrated superior improvement compared to those in the youth
28 and parental component arm.

29 **Conclusions:** Although the addition of the concurrent parenting component was praised by the
30 actively participating parents, overall, this intervention was not statistically superior to the youth-
31 only arm. Only a few variables demonstrated statistically significant improvement, usually with a
32 small effect size. The use of WhatsApp had higher feasibility and uptake than the use of the
33 specially designed application.

34 Under the chosen structure and population, it seems that the program did not have the intended
35 impact. Parents who expressed specific resistance may have negatively affected their children,
36 causing them to be less engaged. A cost-benefit analysis of programs with parental components as
37 well as the development of strategies to enhance parent-school partnership are warranted.

38

39 **Trial registrations:** NCT04129892 (1.11.2017) and NCT03540277 (26.4.2018)

40 **Keywords:** School-based, Prevention, Self-esteem, Body esteem, Mobile application

41

42 **Background**

43 Prior research demonstrates the positive impact of parental involvement on children who participated in
44 various school-based prevention programs [1–3]. Findings from previous studies suggest a relationship
45 between parental involvement in youth programs and improved parent/child communication, bonding,
46 and perceptions of one another. In addition, having common ground experience prolonged the positive
47 post-participation effects of the experience [4].

48 Although parents acknowledge the importance of children’s physical and mental health as well
49 as changing attitudes toward increased parent-school collaboration, few parental component
50 implementation studies on prevention programs in general and positive body and self-esteem
51 prevention programs among adolescents in particular have been conducted. A systemic review of the
52 parental component in prevention programs reported that most programs included a minimal or

53 unassessed parental component. However, many of those that provided a more substantive intervention
54 component for parents failed to recruit or retain sample sizes sufficient to allow statistical significance
55 testing [5].

56 While involving parents appears productive in theory, it is quite different in practice. Parents'
57 own negative school experiences are likely to cause an undesirable impact, thus inducing an adverse
58 avoidance reaction to nonmandatory assignments among their children. Further, uptake, engagement,
59 and the retention of parents in prevention programs are ongoing challenges. Parental attendance rates
60 in family-based programs typically range from 35–50%, and up to one-third of those who enroll do not
61 attend any of the sessions [6]. Family characteristics and competing responsibilities among dual-earner
62 households and parents with more than two children were associated with lower program enrolment.

63 To address the notable disparities in access to evidence-based, cost-effective parenting
64 interventions [7], and to overcome parental engagement barriers as well as enhance prevention
65 program effectiveness, technology-based methods are employed in parenting programs [8]. The
66 prominent use of smartphones among adolescents and their parents has led to an increase in health-
67 related apps [9]. Moreover, digital interventions may also enable researchers to access
68 geographically distant and busy parents [10], while addressing participants' anonymity concerns.
69 Although the efficacy of smartphone-delivered interventions is emerging, high rates of attrition and
70 low adherence were reported, both of which threaten the validity of randomized controlled trial
71 findings [11].

72 In school-based programs, the headteacher and senior management team encourage parental
73 involvement to improve parental uptake. Moreover, parenting involvement is successful when it is
74 part of the school's ethos and is developed and delivered as "a whole school approach" [12].
75 Proactive relationship building with parents via telephone, or in-person pre-program contact was
76 recommended to increase parental engagement. Further, providing update letters with shared
77 assignments and adjunct support were some of the multi-component approaches suggested (e.g.,
78 information sheet, short video) [13, 14].

79 As there is a lack of research on the best practices for parental engagement in shared
80 assignments with their early-adolescents, the current feasibility studies assessed the effectiveness of
81 implementing an evidence-based, school-based wellness program, with and without parental
82 collaboration, through updates and shared tasks on adolescents' self-esteem and body esteem.

83 The studies primarily aimed to assess the feasibility and acceptability of two mobile modes
84 in terms of delivering updates and assignments to parents: WhatsApp vs. "Young in favor of
85 myself," a specially designed application. We hypothesized that using the program's specially
86 designed application to contact parents and deliver the shared assignments would produce better
87 uptake and parental engagement than when delivered via WhatsApp. The second aim was to assess
88 the impact of the additional parental component on adolescents' perceptions and behaviors. The
89 main hypothesis was that adding a parental element to extend adolescents' exposure and
90 engagement to the prevention program's topics would result in superior self-esteem and body
91 esteem, self-care, and media literacy.

92 **Methods**

93 **Design and sample recruitment**

94 The two-year randomized clinical trial tested the feasibility, acceptability, and impact of
95 "Young in favor of myself," a manualized universal, interactive intervention program for young
96 adolescents (5th graders) and their parents. Principals and school counselors of all elementary
97 schools in northern Israel were contacted.

98 The eligibility criteria for schools included: a) having at least two 5th grade classes; b)
99 agreement to schedule the program lessons on Mondays and Thursdays, due to the availability of
100 the students facilitating the research; c) commitment to provide an appropriate room for each of the
101 groups; and d) commitment to the presence of a class teacher or school counselor during the
102 sessions to ensure appropriate behavior. Four schools were eligible to participate in each of the
103 two-year trials.

104 **Randomization and blinding**

105 Following the randomization protocol, eligible schools were randomly allocated by a
106 research assistant blinded to their characteristics. Using the randomization function in Microsoft
107 Excel, each year, schools were randomly assigned to one of the three study conditions: a) control
108 condition, b) youth-only intervention, and c) youth with concurrent parental component condition.
109 Schools were used as selection units to avoid contamination bias due to communication about the
110 intervention between participants and controls within each school. Schools were blinded to
111 condition allocation. Differences in the baseline sample size in each arm were due to varying class
112 sizes in each school.

113 **Study population**

114 In the WhatsApp mode (first trial), 152 adolescents in the 5th grade were recruited for the
115 program and 148 of them provided consent. However, 133 adolescents completed the three
116 assessment questionnaires and were included in the final analysis. In the second study (with the
117 specially designed application), 266 adolescents in the 5th grade were recruited for the program,
118 212 (80%) provided consent, and 137 completed the three assessment questionnaires and were
119 included in the final analysis. Each class was divided into two equal groups for program delivery,
120 comprising a maximum of 15 participants per group. There were eight intervention groups and four
121 control groups in the first year, and 12 intervention groups and six control groups in the second
122 year.

123 Research students from the project team met with parents and staff of each class to recruit
124 schools at parent-teacher conferences. Schools were provided with study information and letters of
125 consent.

126 **Ethical procedures**

127 The el Hai Academic College Institutional Review Board approved the research protocol
128 (No 12/2017/-1 and 08/2018-4). The trial methods and analysis strategy were pre-registered. The
129 universal trial registration numbers are NCT04129892 (1.11.2017) and NCT03540277 (26.4.2018).
130 Parents of students at all eligible schools received information about the program and the research

131 study and provided informed consent. All methods were performed in accordance with the
132 Declaration of Helsinki and Consort 2010 guidelines and regulations.

133 **Interventions**

134 **Youth control arm**

135 The control groups in both studies received three health- and nutrition-related sessions
136 conducted by graduate students of Nutritional Sciences.

137 **Youth intervention arms**

138 "Young in favor of myself" is an interactive program comprising 10 weekly, 90-min
139 sessions on self-care behaviors, media literacy, self-esteem, and positive body image. It is an
140 evidence-based intervention that was empirically supported and substantiated with research
141 findings that demonstrate beneficial and predictable outcomes [15] (Table 1).

142 The program included a kit with background material, a detailed guide for facilitators with
143 structured session plans, a framework for each topic, and interactive activities to engage
144 participants verbally and non-verbally. To trigger situational interest, we used hands-on activities,
145 novelty, surprise, and group work. Age-tailored games were often incorporated into the sessions.
146 The program was semi-structured, with flexibility that enabled facilitators to be creative while
147 addressing their groups' specific needs, as was suggested by Slaten and Elison's [16]. Group
148 facilitators were undergraduate students of Nutritional Sciences and Education, who received
149 intensive training and supervision by the program's founder and an expert social worker throughout
150 the intervention.

151 **Youth intervention with parental component**

152 The parental component included weekly updates for parents about the current topic of
153 discussion in the class. Moreover, one or two of the suggested shared assignments for parents and
154 children were delivered concurrently with the "Young in favor of myself" class-based sessions. For
155 instance, parents and children were required to describe two rights and two responsibilities the
156 child gained in the last two years for the session on "growing up."

157 Two reminders were sent to users who did not complete the weekly assignment. To
158 motivate parents to engage and complete tasks, families received one “star” for each submitted
159 assignment. Families who completed all tasks received a voucher for a family bowling game, to
160 further encourage program adherence.

161 In the first year, the parental component was delivered via the WhatsApp application, while
162 in the second year, it was delivered via the "Young in favor of myself" smartphone application,
163 specially designed and programmed for this purpose (Figure 1).

164

165 **Study questionnaire and data collection procedures**

166 The computerized study questionnaire was completed online by participating students and
167 parents via the Qualtrics XM Platform©, 2019, under the supervision of program facilitators and a
168 research student. Self-report questionnaires were preferred for participant confidentiality.

169 Adolescents and parents completed the same questionnaire at three measure points – at baseline,
170 program conclusion (two months later), and follow-up (three months after program conclusion).

171 Qualitative research aimed to better understand participants' motives, incentives, and ideas
172 about improving the program content, activities, or dissemination [17]. Personal and group semi-
173 structured interviews were conducted with selected schoolteachers and parents at program cessation
174 to gain insights into program content, acceptability, satisfaction, and implementation.

175 **Outcome measures and variables**

176 Standardized instruments were used to measure program efficacy (Table 2). The pre-
177 intervention questionnaire included demographic items on gender, age, familial status, and
178 sociodemographic status. The post-intervention questionnaire consisted of a satisfaction assessment
179 and an attendance report. All scales included in the study questionnaire were previously validated,
180 Hebrew-translated versions.

181

182 **Outcome measures**

183 **The Rosenberg Self Esteem Scale** [18]. The scale consists of 10 items rated on a four-
184 point Likert scale. Items 1, 3, 4, 7, and 10 are scored from *strongly agree* (3) to *strongly disagree*
185 (0), while items 2, 5, 6, 8, and 9 are reverse scored. The total scores range from 0–30. Scores from
186 1–25 indicate a normal range; scores below 15 suggest low self-esteem, while scores above 25
187 indicate high self-esteem. Cronbach's alphas in these studies were 0.79, 0.74, and 0.814 for the
188 control, youth-only, and parental component groups, respectively.

189 **Self-Caring Questionnaire.** Developed by Prof. Moria Golan, this questionnaire includes
190 20 items on personal and sleep hygiene, mealtime behaviors, and personal space. Items are rated on
191 a five-point scale from *never* (1) to *always* (5) and higher scores indicate higher self-care behaviors
192 [19]. The questionnaire was adapted for the parental version to include 20 additional items in which
193 the parents responded according to their children's as well as their own behaviors. Psychometric
194 qualities assessed in a small pilot study (N=10) revealed a Pearson Correlation Coefficient of 0.69
195 for reliability and Cronbach's alpha of 0.85 for internal validity. However, in the current studies
196 Cronbach's alpha was only 0.66.

197 **The Body Esteem Scale** was used to assess body perceptions. The scale consists of 23
198 items divided into three subscales: appearance, weight, and attribution. The mean total and subscale
199 scores are rated on a five-point Likert scale from *never* (1) to *always* (5). Higher scores represent
200 higher body esteem [20]. Cronbach's alphas in these studies were 0.79, 0.89, and 0.85 for the
201 control, youth-only, and parental component groups, respectively.

202 **The Eating Disorders Examination Questionnaire-8** adapted for children (ChEDE-Q-8)
203 was used to assess eating disorder symptoms. The eight-item version of the original 28-item EDE-
204 Q has excellent item characterization with high reliability. A strong correlation was found between
205 the eight-item version and the original EDE-Q ($r = 0.97$, $P < 0.001$). For each statement,
206 participants are asked to mark the frequency of occurrence in the past 28 days, and higher scores
207 indicate a higher risk for eating disorders [21].

208 **The advertising scale** contains one item to measure participants' identification of media
209 strategies—a known protective factor. It includes eight different strategies, from which participants

210 are required to choose; identifying a higher number of strategies indicates better media literacy
211 [22].

212 **The 'Pressures by Media' subscale** of the Sociocultural Attitudes Towards Appearance
213 Questionnaire-4 (SATAQ-4) was used to assess participants' responses to media. Participants were
214 instructed to rate their agreement with each item using a five-point Likert-type scale from *definitely*
215 *disagree* (1) to *definitely agree* (5). A higher average score indicates higher pressures by the media
216 to change one's appearance [23].

217 **Sample size and data analysis**

218 The sample size was calculated for a moderate expected effect ($f = 0.25$), 80% statistical
219 power, and an α level of 0.05, which was relative to the improvement in the Rosenberg Self Esteem
220 Scale [24] and based on our previous data [19]. Calculation using G * Power software version
221 3.1.9.4 yielded a sample size requirement of 108 participants in all groups (parental component
222 arm, youth-only intervention, control). Accounting for a 20% dropout rate, the total required
223 sample was 120 participants in the three groups for each study. All analyses were conducted using
224 IBM SPSS Statistics for Windows version 24, IBM Corp., Armonk, NY, 2017.

225 In the first study (WhatsApp), only those who completed the research questionnaire at two
226 assessment times were included in the analysis. In the second trial (specially designed application),
227 only those who completed the questionnaire at all three assessment times were included in the
228 analysis, to prevent imputation bias. When data in this trial were analyzed with all participants who
229 completed only two assessments, similar results were reached. The demographic variables between
230 those who completed three questionnaires and those who completed less than three questionnaires
231 were not statistically significant.

232 Data were checked for normality using histograms, scenes, and the Kolmogorov-Smirnov
233 test through the Box test and Levene test. Sphericity was assessed through the Mauchly test and the
234 assumption of the equality of variance-covariance matrices. The outcome data for the first study
235 (WhatsApp) were analyzed using multivariate analysis of variance models by calculating the deltas

236 between measure points (T2-T1, T3-T1) and using Bonferroni post hoc analyses between study
237 groups.

238 In the specially designed application (second study), categorical demographic
239 characteristics were presented as frequencies and percentages, and the association with study
240 groups was tested using chi-square tests. Continuous demographic characteristics were presented as
241 mean and standard deviation, and the differences between study groups were tested using the
242 Kruskal-Wallis Test.

243 Most of the measures in this study (specially designed application) were not normally
244 distributed and were therefore analyzed using non-parametric tests. Friedman tests were used to
245 examine the differences between study times within each group, and Kruskal-Wallis tests were
246 used to examine differences between the three study groups at each time point. Personal self-care
247 hygiene and SATAQ-4 were tested using mixed model analysis. The effect size was marginal R^2
248 for the mixed models, eta-squared for the Kruskal-Wallis Test, and Kendall's W for the Friedman
249 test.

250 For the qualitative analysis, all semi-structured interviews were audio-recorded and
251 transcribed. The interview included questions on participants' understanding of the program aims,
252 barriers and facilitators to engagement, satisfaction from the topics and activities, and
253 acknowledgments of change among their children.

254 The data were analyzed by identifying recurring key themes, which represented ways of
255 understanding the combined meanings within the texts [25]. We chose a meta-ethnography
256 analysis, widely used to qualitatively synthesize data in health and social care research [26].
257 Following the thematic analysis, we attempted to build a general interpretation based on the data
258 [25]. This interpretive layer enabled deeper insights into the barriers faced in disseminating and
259 implementing parental components in school-based prevention programs.

260 **RESULTS**

261 **Responsiveness of adolescents and parents**

262 Results found that the responsiveness to program assignments deteriorated over time (Table
263 3 and Figure 2). The concurrent parental arm demonstrated higher resistance to participate in the
264 study, with the lowest percentage of consenting parents and the lowest rate of adolescents who
265 completed the questionnaire at all assessment times, found in both digital modes.

266 The WhatsApp mode of delivery was associated with 12% of allocated participants
267 declining to provide consent for their children to participate in the accompanying research. In
268 comparison, 38% declined to consent when the specially designed application was employed.

270 Over time, the decrease in adolescent engagement was the lowest in the youth-only arm
271 compared with the control group. A greater reduction in session attendance was found among
272 adolescents in the parental component arm. Overall, the study groups and research stages show a
273 significant superiority in participant responsiveness to WhatsApp as compared to the specially
274 designed application (Table 3 and Figure 2). No significant differences were found in baseline
275 demographics and outcome characteristics between participants that completed the three research
276 questionnaires and those that did not.

277

278 **Qualitative interviews**

279 Conducted after program termination, these interviews shed light on parental and school team
280 perceptions regarding addition of the parental component to the school-based wellness program. Five
281 major themes emerged in the qualitative component of this study:

- 282 1. Most parents perceived school activity as a burden. "...leave us in harmony with our children,
283 don't interfere with the house schedule and type of conversation. I know you have good
284 intentions, but I prefer if the school works within its territory and does not enroll me for shared
285 tasks" (H.I.). "It is so hard to manage with four kids... the competing demands are my priority and
286 not the suggested shared tasks... Moreover, my child is healthy; we don't need it. Deliver it to
287 parents with problematic children" (R.B.).
- 288 2. Rule enforcement. School teachers perceived the engagement of parents as necessary but
289 preferred not to confront parents who expressed silent resistance. "The contents and the activities

290 are great and age appropriate. However, most parents choose not to cooperate, and I prefer to
291 choose my battles. If a parent chose not to cooperate, I will not penetrate his territory. I have to
292 respect his avoidance. Personally, I admit, I am not particularly eager to cooperate when my
293 child's school enrolls me in activities" (M.C.). "I did not choose this program, and it does not
294 address my priorities in being involved in the schools' activities." (B.R.)

295 3. Parental resistance to consent to participate in the research. Parents explained their resistance to
296 participate due to privacy threat, fear of exposure, and law literacy regarding their and their
297 children's benefit from the research process. "Why should my child and I be like an experimental
298 animal? If the program still needs research, I am not sure it is safe..." (A.R.). "I have heard from
299 parents in the previous year that the research questionnaire is invasive. I will be honest with you; I
300 don't want you to wake sleeping dogs. Questions about how she feels about her body should be
301 asked in a protective environment and not in primary school or on a research platform" (B.Y.).

302 4. Preference of WhatsApp usage over unique applications due to technological barriers and privacy
303 issues. "At the beginning, I was glad the assignments were delivered via a digital platform, but
304 when I failed to download the application, I decided that if someone wants me to participate. I
305 prefer if it is sent through mail" (L.A). "I am overwhelmed with all the applications on my
306 mobile; I don't want another one that increases the chance to hack my phone – too dangerous in
307 our times."

308 5. High satisfaction was reported by parents and preadolescents who adhered to the shared
309 assignments. "The topics in the program are vital for our children. The shared tasks were an
310 excellent opportunity to talk with my child about how I handled age-related changes and how I
311 react to stress" (B.C.). "These topics are so important, and to tell you the truth, in the classroom
312 my child is too shy, and the shared assignment opened the door for him for intimate sharing and
313 for me to get closer to him. Well done" (A.R).

314

315 **Baseline descriptive characteristics of participants**

316 In both studies, the mean age of all youth participants, both male and female, was 10.1 years
317 (SD = 0.3). Groups appeared to be well balanced on baseline demographic characteristics (Table 4) as
318 well as baseline outcomes values (Table 5). This was observed when data analyses were applied on
319 the sample that included participants who completed at least two questionnaires as well as when only
320 those who completed all three assessment questionnaires were included.

321 **Intervention efficacy**

322 **Self-care** (Table 6)

323 **Personal self-care hygiene** was not affected by the trial condition in either digital mode. A
324 statistically significant interaction of group X time was found ($p < 0.001$; $R^2 = 0.03$) with a small
325 effect size with superiority in the control group.

326 **Self-territory care** was not affected by group or by times in either study. Nevertheless, in
327 the specially designed application (second study), there was a statistically significant group X time
328 effect with superiority (small effect size) in the concurrent parental component arm, along with all
329 assessment times compared with the other two groups.

330 **Self-esteem**

331 In the WhatsApp mode (first trial), there was a statistically significant group effect with
332 a small effect size ($p < 0.005$; $\eta^2 = 0.04$) on youths' self-esteem in the parental component arm at
333 post-intervention. This improvement diminished at the three-month follow-up (Figure 3).

334 In the second trial (specially designed application), a statistically significant change in
335 youths' self-esteem was also found at the follow-up assessment. The improvement was larger in the
336 control (moderate effect size) and youth-only arms (small effect size), with no statistically
337 significant change in the parental component arm (Table 7).

338 **Body esteem**

339 In the WhatsApp mode (first trial), there was no effect of trial conditions on either of the
340 body-esteem subscales. In the specially designed application mode (second trial), there was a
341 statistically significant effect of group on the body-esteem-appearance subscale, at program
342 termination, with statistically significant superiority in the youth-only arm at post-intervention as

343 well as at the follow-up assessment (small effect sizes). In the weight subscale, there was no group
344 or time effect. However, there was a statistically significant interaction of group X time with
345 superiority in the control group at the follow-up assessment, with moderate effect size. (Table 8).

346 **Media literacy**

347 Media literacy was assessed using the number of advertisement strategies identified and the
348 perception of being influenced by media pressures to change one's appearance.

349 In the WhatsApp mode (first trial), the youth-only arm and the concurrent parental component arm
350 demonstrated a statistically significant superiority and increase in identifying advertisement
351 strategies over time compared with the control arm (Figure 4) with a large effect size ($\eta^2 = 0.264$).

352 No effect of trial conditions was found on the perceived pressure experienced by the media to
353 change appearance (SATAQ-4).

354
355 In the specially designed application mode (second trial), there was no effect of trial
356 conditions on the number of advertisement tactics identified by youth and on perceived pressure
357 imposed by the media to change appearance (SATAQ-4). Nevertheless, when youth responses were
358 divided into those under 1 (not affected by media) and above 1 (affected to a large extent), the
359 analysis revealed a decrease of 29% in the control group among youth being affected (from 73.7%
360 at baseline to 44.7 at follow-up). Moreover, a 31% reduction (from 64% to 33%) in the youth-only
361 arm and a 14% reduction in the parental component arm (from 68% at baseline to 54% at follow-
362 up) were found. Mixed model analysis revealed a statistically significant effect of group ($\chi^2 = 6.44$;
363 $p < 0.05$), time ($\chi^2 = 20.96$; $p < 0.001$), and time X group ($\chi^2 = 13.27$; $p < 0.01$).

364 **Eating disorders behaviors**

365 There was no effect of trial conditions or study arms on the eating disorders' behavior scores. At all
366 assessment points, the scores were far below the cut-off for identifying pathology in this age group.

367 **Discussion**

368 There is robust evidence of the associated positive outcomes of parental engagement in
369 school-based prevention programs [27–29]. This evidence is consistent with Bronfenbrenner's
370 ecological systems theory [30, 31], which proposes that interactions with parents around learned

371 topics at school might help address internalizing concerns [4, 32]. Digital-based prevention
372 programs were suggested for this purpose [33-35].

373 The current study examined the feasibility and impact of concurrent parental components
374 (parents receive updates and shared assignments with adolescents) integrated into "Young in favor
375 of myself," a school-based interactive wellness program for 5th grade primary school students. The
376 parental component includes weekly topic update letters to parents, with suggestions for dyad-
377 shared assignments. A prior study has suggested this strategy to avoid parents from falling into the
378 role of disciplinarians [4].

379 The current study revealed that parents' engagement in the shared assignments was short-
380 term only and deteriorated during trial times. Participants' attrition presents a significant problem
381 for even the most well-planned and well-executed intervention projects with internal and external
382 validity and facilitator motivation. For instance, Amaral et al. reported that 50% of intervention
383 participants attended all four prevention program sessions and completed the posttest assessment
384 [34]. Morgan et al reported that only 38% of the parents that participated in mental health first aid
385 training completed the 3-yrs follow-up assessment [35]

386 However, the retention rate was higher when the concurrent parental component was
387 delivered by WhatsApp than by a specially designed application. The application was designed to
388 create an intimate environment where parents could consult the specialist who developed the shared
389 assignments, and ask personal questions related to the discussed topics, anonymously or openly.
390 Moreover, this platform was intended to serve facilitators by sending memos and funny responses
391 to generate continuity and engagement with the program topics. In contrast to our hypothesis and
392 expectations, parents expressed resistance to downloading the specially designed application.

393 Although parents believed in the program's importance and shared the school's interest in
394 preventing risk behaviors, they did not perceive the program as being their choice or as reflecting
395 their needs and interests. Although most parents (not all) provided consent, they easily withdrew
396 their consent when it came to implementation. From the perspective of an external supplier, the

397 partnership between parents and schools felt weak, and contributed to the barriers in
398 implementation and adoption of prevention programs.

399 Barriers, such as technical difficulties, fear of exposure, concerns about privacy, and lower
400 motivation to collaborate on shared assignments were explored retrospectively through qualitative
401 interviews. Similar barriers were reported in studies that implemented parental components in
402 school-based prevention programs [36]. These barriers may be attributed to the rapid proliferation
403 of social networking that has transformed the way people socialize and communicate [37]. Parents,
404 like other human beings, are more concerned with their freedom and privacy owing to the
405 developed vigilance toward technology and media penetrations. As was shared in the personal
406 interviews, parents tend to develop negative attitudes to experimental research and prevention
407 programs that were not personally chosen by them, sometimes unconsciously. The shift from
408 worshipping the collective and the community to individuality in western societies [38] is also
409 expressed in the imbalanced parent-school partnership. It seems, as years go by, the relationship
410 between parents and the education system shapes the feasibility and effectiveness of school-based
411 prevention programs. Often, shared parent-child school-based assignments tend to trigger responses
412 to the intervention itself, thus failing to address the program objectives [39].

413 In contrast to the current study hypotheses and others' findings, our statistical comparisons
414 revealed that the addition of the parental component was not statistically superior to the youth-only
415 arm. Thus, under the chosen structure and population, the program did not have the intended
416 impact. Moreover, parents' resistance to the parental component may have induced negative
417 attitudes among their children, thus diminishing their ability to be positively influenced by the
418 program content, as seen in the described trials' effects.

419 Further, it seems that WhatsApp was preferred by adults over the specially designed
420 application. This may be attributed to the perceptions that WhatsApp is more intimate [40].
421 Moreover, the specially designed application provoked resistance due to the need to download "one
422 more temporarily used item to the mobile phone" as was suggested in the qualitative interviews.

423 Overall, the study groups and the research stages showed a significant superiority in
424 participant responsiveness to WhatsApp over the specially designed application. The concurrent
425 parental component via WhatsApp was associated with statistically significant improvements in
426 only two measures out of the seven outcome variables and only one statistically significant
427 improvement in the youth-only arm. The concurrent parental component delivered via the specially
428 designed application mode showed a statistically significant improvement in only one out of the
429 seven measures. The youth-only arm showed statistically significant improvements in three out of
430 the seven outcome measures. However, the small effect size of most changes may suggest that a
431 larger sample size and more intensive exposure are needed for future assessments. Four statistically
432 significant improvements were found in the control group, which received a shorter intervention.
433 Due to higher attrition in this group (control arm of the second trial), the outcomes may be attrition
434 biased. Morgan et al [35] who studied the long-term effect of prevention program reported that
435 between baseline and 3-year follow-up, there was a non-significant reduction in adolescent cases of
436 mental health problems relative to the control group (odds ratios (OR) 0.16–0.17), a non-significant
437 improvement in parental support reported by adolescents with a mental health problem (OR 2.80–
438 4.31), and a non-significant improvement in the quality of support that parents reported providing
439 to their adolescents with a mental health problem ($d = 0.38$). The only maintained achievements
440 parents' improved knowledge about mental health problems. Both Morgan's et al. and our results
441 question the contribution of parental component in school-based programs.

442 **Strengths and limitations**

443 This study has several strengths. First, two active control groups were used; one youth-only
444 group, without the parental component, and another with a shorter intervention to control
445 expectancy effects. Second, the combination of quantitative and qualitative research methods
446 deepens the understanding of the implementation of the parental component arm.

447 The current study has a few limitations. First, as mentioned before, attrition bias may
448 contribute to the study outcome. Despite this, no effects on outcomes were found in comparing the
449 analyses between participants who submitted the shared assignments and those who did not, as well

450 as in the analyses between those who completed two vs. three questionnaires. Second, the findings
451 of this study are based on self-reports, which could be subject to social desirability bias.
452 Additionally, our results may not be representative of the preadolescent population as this study
453 was performed with a selective population in a small country. Thus, conclusions should be
454 interpreted with caution. Nevertheless, the consistent non-significant effect of the experimental
455 parental component on most measures supports the robustness of the findings, despite the
456 limitations and the fact that the study findings contrasted with the research hypothesis.

457 **Conclusions**

458 The use of the WhatsApp application had higher feasibility and uptake than the use of the
459 specially designed application. Although parents and school team members expressed a positive
460 stance toward shared assignments, poor uptake, dropout, and noncompliance may hinder the
461 validity of our findings. Moreover, the relatively low rate of parental cooperation and the small
462 effect sizes raise questions regarding the cost-effectiveness of adding a parental component to
463 universal school-based prevention programs. Future studies should strive to overcome parental
464 resistance as well as improve parent-school collaboration. Moreover, a cost-benefit analysis of
465 parenting programs is critical for scaling up prevention programs.

466

467 **List of abbreviations**

468	RCT	randomized clinical trial
469	app	application
470	ChEDE-Q-8	The Eating Disorders Examination Questionnaire-8 adapted for children
471	SATAQ-4	Sociocultural Attitudes Towards Appearance Questionnaire-4
472	OR	odds ratios
473	d	d cohen effect size

474 **Declarations**

475 **Ethics approval and consent to participation**

476 The Tel Hai Academic College Institutional Review Board approved the research protocol
477 (No 12/2017/-1 and 08/2018-4). The trial methods and analysis strategy were pre-registered. The
478 universal trial registration numbers are NCT04129892 (1.11.2017) and NCT03540277 (26.4.2018).
479 Parents of students at all eligible schools received information about the program and the research
480 study and provided informed consent. All methods were performed in accordance with the
481 Declaration of Helsinki regulations and Consort 2010 guidelines.

482 **Consent for publication**

483 Not applicable

484

485 **Availability of data and materials**

486 The data that support the findings of this study are available from the first author upon reasonable
487 request and with permission of The College IRB. Restrictions apply to the availability of these data
488 by the ministry of education, and so are not publicly available.

489 **Competing interests**

490 The authors declare that they have no competing interests.

491 **Funding**

492 Tel Hai Academic College research authority funded both studies. They had no role in the design,
493 collection, analysis, and interpretation of data and in writing the manuscript.

494

495 **Authors' contributions**

496 All authors contributed substantially to this paper. MG contributed the first draft. SB, AS and NA
497 provided the qualitative and quantitative information. MM produced the figures and tables and
498 reviewed the paper. All authors have read and approved the manuscript.

499 **Acknowledgement**

500 We would like to thank Editage (www.editage.com) for English language editing.

501

502 **References**

- 503 1. Alfredsson EK, Thorvaldsson V, Axberg U, Broberg AG. Parenting programs during
504 adolescence: Outcomes from universal and targeted interventions offered in real-world
505 settings. *Scand J Psychol.* 2018;59:378–91. doi:10.1111/sjop.12446.
- 506 2. Barlow J, Coren E. The effectiveness of parenting programs: A review of Campbell
507 Reviews. *Res Soc Work Pract.* 2018;28:99–102. doi:10.1177/1049731517725184.
- 508 3. Hill KE, Hart LM, Paxton SJ. Confident body, confident child: outcomes for children of
509 parents receiving a universal parenting program to promote healthful eating patterns and
510 positive body image in their pre-schoolers. An exploratory RCT extension. *Int J Environ
511 Res Public Health.* 2020;17(3):891. doi:10.3390/ijerph17030891
- 512 4. Duerden MD, Witt PA, Harrist CJ. The impact of parental involvement on a structured
513 youth program experience: A qualitative inquiry. *J Youth Dev.* 2013;8:106–23.
514 doi:10.5195/jyd.2013.88.
- 515 5. Hart LM, Damiano SR, Li-Wai-Suen CSN, Paxton SJ. Confident body, confident child:
516 Evaluation of a universal parenting resource promoting healthy body image and eating
517 patterns in early childhood—6- and 12-month outcomes from a randomized controlled trial.
518 *Int J Eat Disord.* 2019;52:121–31. doi:10.1002/eat.22992.
- 519 6. Chu JTW, Wadham A, Jiang Y, Whittaker R, Stasiak K, Shepherd M, et al. Effect of
520 MyTeen SMS-based mobile intervention for parents of adolescents: A randomized clinical
521 trial. *JAMA Netw Open.* 2019;2:e1911120. doi:10.1001/jamanetworkopen.2019.11120.
- 522 7. Yap MBH, Mahtani S, Rapee RM, Nicolas C, Lawrence KA, MacKinnon A, et al. A
523 tailored web-based intervention to improve parenting risk and protective factors for
524 adolescent depression and anxiety problems: Postintervention findings from a randomized
525 controlled trial. *J Med Internet Res.* 2018;20:e17. doi:10.2196/jmir.9139.
- 526 8. Corralejo SM, Domenech Rodríguez MM. Technology in parenting programs: A systematic
527 review of existing interventions. *J Child Fam Stud.* 2018;27:2717–31. doi:10.1007/s10826-

- 528 018-1117-1.
- 529 9. Schueller SM, Torous J. Scaling evidence-based treatments through digital mental health.
530 *Am Psychol.* 2020;75:1093–104. doi:10.1037/amp0000654.
- 531 10. Dhaliwal J, Perez AJ, Holt NL, Gokiart R, Chanoine JP, Morrison KM, et al. Why do
532 parents discontinue health services for managing paediatric obesity? A multi-centre,
533 qualitative study. *Obes Res Clin Pract.* 2017;11:335–43. doi:10.1016/j.orcp.2016.10.285.
- 534 11. Linardon J, Cuijpers P, Carlbring P, Messer M, Fuller-Tyszkiewicz M. The efficacy of app-
535 supported smartphone interventions for mental health problems: A meta-analysis of
536 randomized controlled trials. *World Psychiatry.* 2019;18:325–36. doi:10.1002/wps.20673.
- 537 12. Hornby G, Blackwell I. Barriers to parental involvement in education: An update. *Educ*
538 *Rev.* 2018;70:109–19. doi:10.1080/00131911.2018.1388612.
- 539 13. Hackworth NJ, Matthews J, Westrupp EM, Nguyen C, Phan T, Scicluna A, et al. What
540 influences parental engagement in early intervention? Parent, program and community
541 predictors of enrolment, retention and involvement. *Prev Sci.* 2018;19:880–93.
542 doi:10.1007/s11121-018-0897-2.
- 543 14. O’Toole L, Kiely J, McGillicuddy D, O’Brien EZ, O’Keeffe C. Parental involvement,
544 engagement and partnership in their children’s education during the primary school years
545 National Parents Council. 2019.[https://researchrepository.ucd.ie/bitstream/10197/9823/2/](https://researchrepository.ucd.ie/bitstream/10197/9823/2/Parental%20Involvement%20Research%20Doc.pdf)
546 [Parental%20Involvement%20Research%20Doc.pdf](https://researchrepository.ucd.ie/bitstream/10197/9823/2/Parental%20Involvement%20Research%20Doc.pdf). Accessed March 2021
- 547 15. Golan M, Ahmad WA. School-based versus after-school delivery of a universal wellness
548 programme—A randomized controlled multi-arm trial. *Eat Behav.* 2018;31:41–7.
549 doi:10.1016/j.eatbeh.2018.08.003.
- 550 16. Slaten CD, Elison ZM. Interpersonal process group counseling for educationally
551 marginalized youth: The MAGNIFY program. *J Sch Couns.* 2015;13.
- 552 17. Patton MQ. *Qualitative research and evaluation methods.* Thousand Oaks, CA: Sage
553 Publications; 2002.
- 554 18. Rosenberg M. *Conceiving the self.* Malabar, FL: RE Krieger; 1986.

- 555 19. Gasanov E, Abu Ahmad W, Golan M. Assessment of “young in favor of myself”: A school-
556 based wellness program for preadolescents. *EC Psychol Psychiatr*. 2018;7:13–22.
- 557 20. Mendelson BK, Mendelson MJ, White DR. Body-esteem scale for adolescents and adults. *J*
558 *Pers Assess*. 2001;76:90–106. doi:10.1207/S15327752JPA7601_6.
- 559 21. Kliem S, Schmidt R, Vogel M, Hiemisch A, Kiess W, Hilbert A. An 8-item short form of
560 the Eating Disorder Examination-Questionnaire adapted for children (ChEDE-Q8). *Int J Eat*
561 *Disord*. 2017;50:679–86. doi:10.1002/eat.22658.
- 562 22. Golan M, Hagay N, Tamir S. The effect of "in favor of myself": Preventive program to
563 enhance positive self and body image among adolescents. *PLoS One* 2013;8:e78223.
564 doi:10.1371/journal.pone.0078223.
- 565 23. Schaefer LM, Burke NL, Thompson JK, Dedrick RF, Heinberg LJ, Calogero RM, et al.
566 Development and validation of the Sociocultural Attitudes Towards Appearance
567 Questionnaire-4 (SATAQ-4). *Psychol Assess*. 2015;27:54–67. doi:10.1037/a0037917.
- 568 24. Rosenberg M. *Society and the adolescent self-image*. Princeton, NJ: Princeton University
569 Press; 1965.
- 570 25. Bearman M, Dawson P. Qualitative synthesis and systematic review in health professions
571 education. *Med Educ*. 2013;47:252–60. doi:10.1111/medu.12092.
- 572 26. Dixon-Woods M, Agarwal S, Jones D, Young B, Sutton A. Synthesising qualitative and
573 quantitative evidence: a review of possible methods. *J Health Serv Res Policy*. 2005;10:45–
574 53. doi:10.1177/135581960501000110.
- 575 27. Guagliano JM, Armitage SM, Brown HE, Coombes E, Fusco F, Hughes C, et al. A whole
576 family-based physical activity promotion intervention: Findings from the Families
577 Reporting Every Step to Health (FRESH) pilot randomised controlled trial. *Int J Behav Nutr*
578 *Phys Act*. 2020;17:120. doi:10.1186/s12966-020-01025-3.
- 579 28. Kilpatrick KD, Kilgus SP, Eklund K, Herman KC. An evaluation of the potential efficacy
580 and feasibility of the resilience education program: A tier 2 internalizing intervention.
581 *School Ment Health*. 2021. doi:10.1007/s12310-021-09428-8.

- 582 29. Wild CE, Rawiri NT, Willing EJ, Hofman PL, Anderson YC. What affects programme
583 engagement for Māori families? A qualitative study of a family-based, multidisciplinary
584 healthy lifestyle programme for children and adolescents. *J Paediatr Child Health*.
585 2021;57:670–6. doi:10.1111/jpc.15309.
- 586 30. Bronfenbrenner U. *The ecology of human development: Experiments by nature and design*.
587 Cambridge, MA: Harvard University Press; 1979.
- 588 31. Bronfenbrenner U. Interacting systems in human development. Research paradigms:
589 Present and future. In: Bolger N, Caspi A, Downey G, Moorehouse M, editors. *Persons in*
590 *context: Developmental processes*. Cambridge, UK: Cambridge University Press; 1988. p.
591 25–49.
- 592 32. Kilgus MD, Maxmen JS, Ward NG. *Essential psychopathology & its treatment*. 4th ed. New
593 York, NY: WW Norton & Company; 2015.
- 594 33. Zeiler M, Kuso S, Nacke B, Klesges LM, Waldherr K. Evaluating reach, adoption,
595 implementation and maintenance of Internet-based interventions to prevent eating disorders
596 in adolescents: A systematic review. *Eur J Public Health*. 2020;30:179–88.
597 doi:10.1093/eurpub/ckz130.
- 598 34. Amaral ACS, Stice E, Ferreira MEC. A controlled trial of a dissonance-based eating
599 disorders prevention program with Brazilian girls. *Psicol Reflex Crit*. 2019;32:13.
600 doi:10.1186/s41155-019-0126-3.
- 601 35. Morgan J, Fischer JA, Hart LM, Kelly CM, Kitchener BA, Reavley NJ, Yap MBH, and
602 Jorm AF. Long-term effects of Youth Mental Health First Aid training: randomized
603 controlled trial with 3-year follow-up. *BMC Psychiatry*. 2020;20:487
604 <https://doi.org/10.1186/s12888-020-02860-1>.
- 605 36. Hayes D, Christie P, Mills M, Lingard, B. *Teachers and schooling making a difference:*
606 *Productive pedagogies, assessment and performance*. London, UK: Routledge; 2020.
- 607 37. Flannery H, Portnoy S, Daniildi X, Kambakara Gedara C, Korchak G, Lambert D, et al.

- 608 Keeping young people connected during COVID-19: The role of online groups. Arch Dis
609 Child. 2021. doi:10.1136/archdischild-2020-320222.
- 610 38. Cohen AO, Breiner K, Steinberg L, Bonnie RJ, Scott ES, Taylor-Thompson K, et al. When
611 is an adolescent an adult? Assessing cognitive control in emotional and nonemotional
612 contexts. Psychol Sci. 2016;27:549–62. doi:10.1177/0956797615627625.
- 613 39. Garcia LMT, Hunter RF, de la Haye K, Economos CD, King AC. An action-oriented
614 framework for systems-based solutions aimed at childhood obesity prevention in US Latinx
615 and Latin American populations. Obes Rev. 2021:e13241. doi:10.1111/obr.13241.
- 616 40. Waterloo SF, Baumgartner SE, Peter J, Valkenburg PM. Norms of online expressions of
617 emotion: Comparing Facebook, Twitter, Instagram, and WhatsApp. New Media Soc.
618 2018;20:1813–31. doi:10.1177/1461444817707349.

619

620 **Table Titles and Figure Legends**

621 **Table 1** Content and description of the program sessions

622 **Table 2** Overview of measures used to evaluate program efficacy in students and parents

623

624 **Table 3** From allocation to analysis - number and percentages of participants in both digital modes
625 along research stages

626

627 **Figure 1** Screenshots (translated to English) from the "In Favor of Myself" smartphone application.

628 **Figure 2** Number of Dyad's shared assignments' submission (parental component arm) delivered
629 through WhatsApp vs. the special application

630 **Figure 3** WhatsApp mode: Youths' self-esteem in the three groups over time

631 **Figure 4** WhatsApp mode: Number of advertising strategies identified in each study arm over time

632

Figures

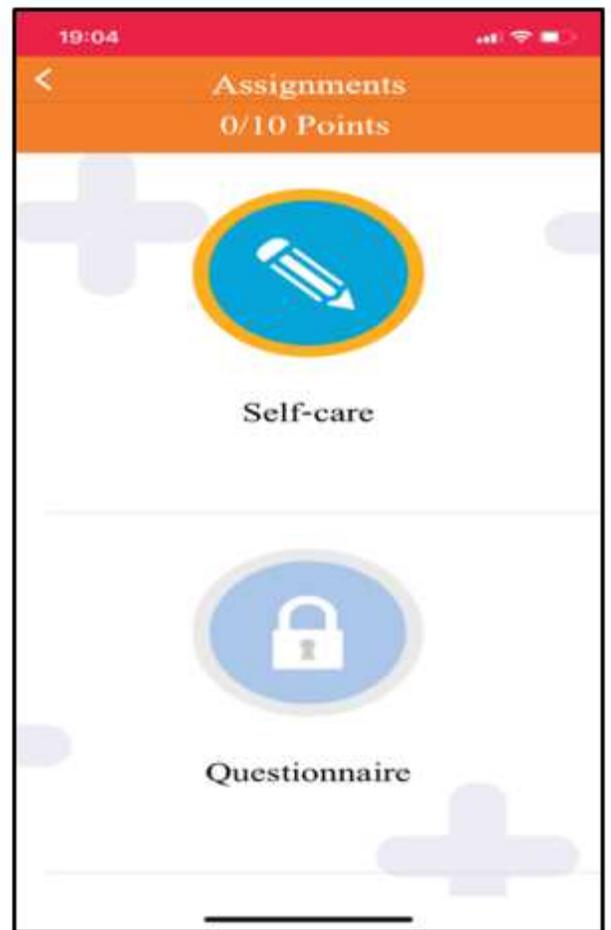
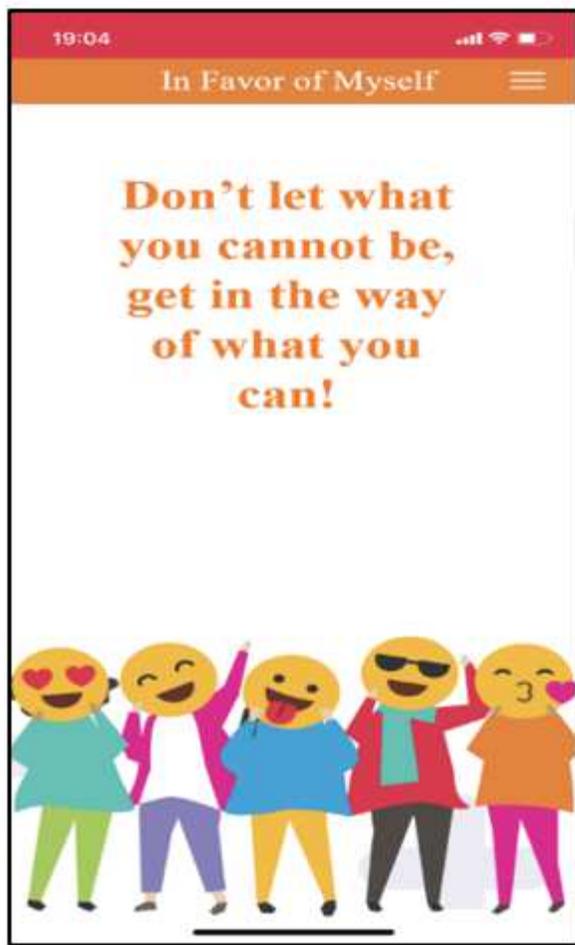


Figure 1

Screenshots (translated to English) from the "In Favor of Myself." Smartphone application.

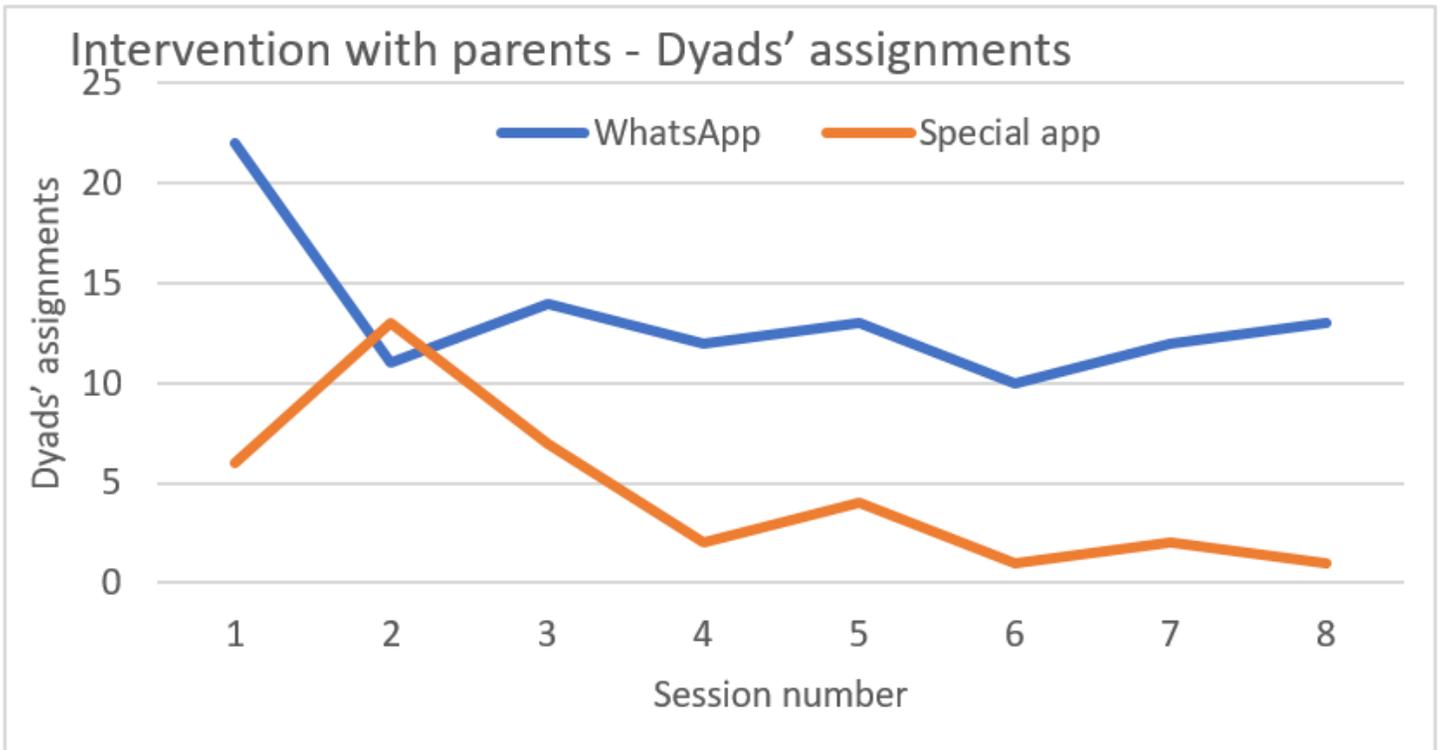


Figure 2

Number of Dyad's shared assignments' submission (parental component arm) delivered through WhatsApp vs. the special application

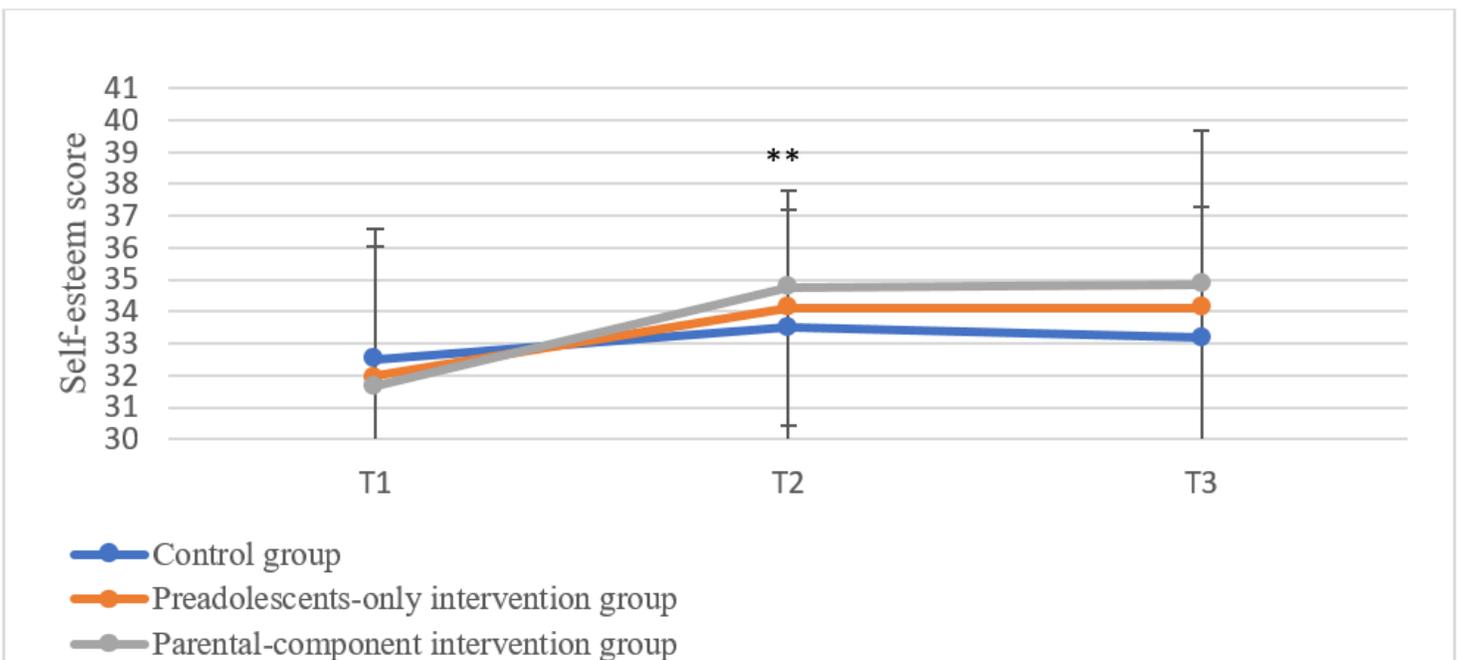


Figure 3

WhatsApp Mode: Youth's Self-esteem in the three groups over time **p= 0.02 between group-differences

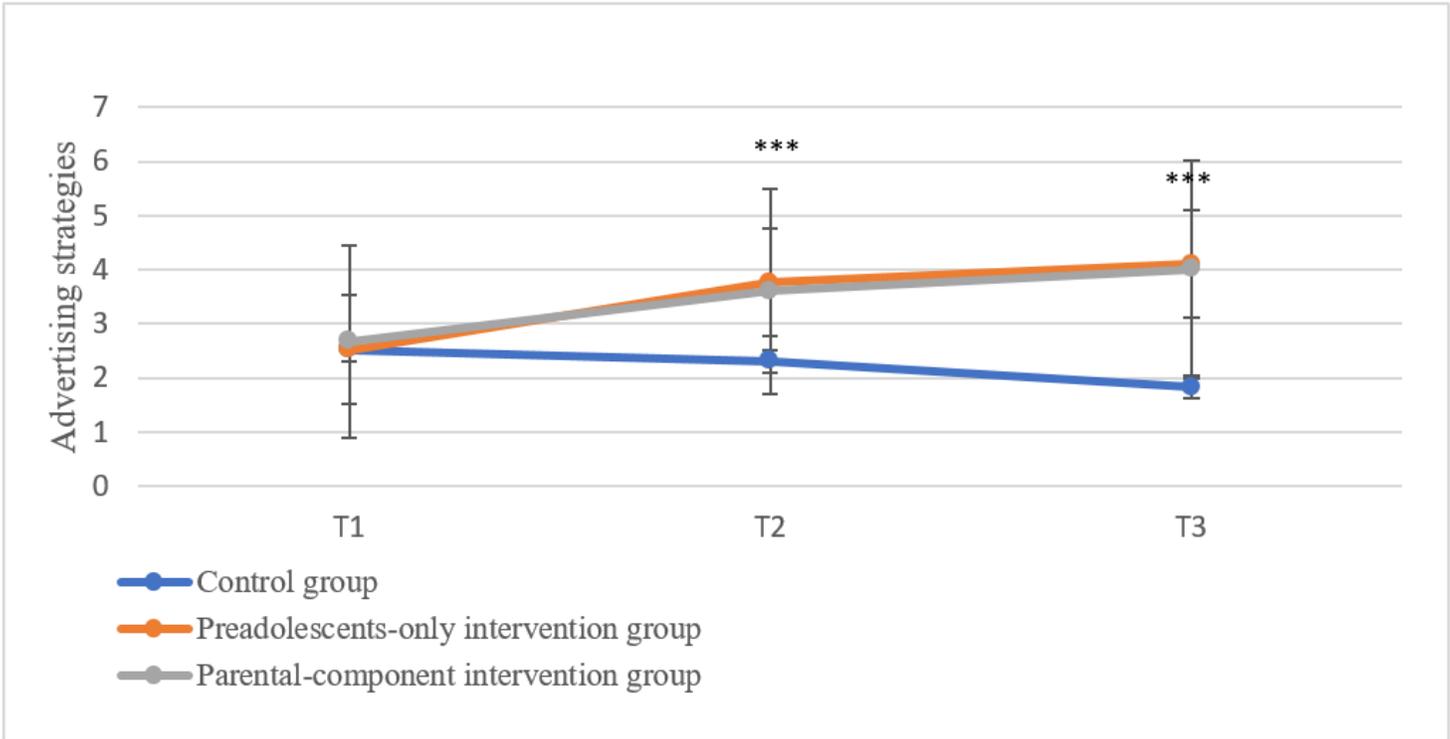


Figure 4

WhatsApp mode: Number of advertising strategies identified in each study arm over time **p<0.001 between group-differences