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Factors Affecting Physical Activity in Ecuadorian Adolescents: A Focus Group Study

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1 **Abstract**

2 **Background:** Physical inactivity levels are increasingly prevalent among Ecuadorian
3 adolescents. School-based interventions can be potentially effective in promoting physical
4 activity but must be informed by cultural-specific factors.

5 **Methods:** Twelve focus groups were carried out with adolescents ($N=80$) in rural and urban
6 Ecuador to identify factors influencing physical activity. Additionally, four focus group
7 discussions with parents ($N=32$) and four with school staff ($N=32$) were conducted.
8 Individual and environmental factors were questioned using the ‘Attitude, Social influences
9 and Self-efficacy’ model and the socio-ecological model as theoretical frameworks.

10 **Results:** Factors influencing physical activity varied between groups. In the rural area
11 farming and norms for girls impeded leisure-time physical activity, whereas urban groups
12 emphasised traffic and crime concerns. Groups from a low socio-economic status more
13 frequently mentioned a fear of injuries and financial constraints. Several factors were
14 common for all groups including preferences for sedentary activities, poor knowledge, time
15 constraints and laziness, as well as a lack of opportunities at home and school, unsupportive
16 parental rules and lack of role models.

17 **Conclusion:** A conceptual framework including the identified factors emerged to inform the
18 design of a cultural-sensitive school-based intervention to improve physical activity among
19 Ecuadorian adolescents. Future interventions should be tailored to each setting.

20

21

22

23 **Background**

24 Physical inactivity rates are on the rise among young people living in low- and middle-income
25 countries (LMICs) and impose a major burden on health^{1,2}. A large body of evidence shows
26 that physical inactivity increases the risk of non-communicable diseases, such as type 2
27 diabetes, cancer and cardiovascular disease, all of which result in an overall decline in life
28 expectancy³. Low levels of physical activity (PA) are key contributors of the obesity
29 epidemic⁴ and many deaths can be precluded each year if people are physically active⁵.

30 In addition, it has been advocated that healthy PA habits early in life are predictive of PA
31 habits and health benefits in adulthood^{6,7}. However, up to 80% of adolescents aged 13 to 15
32 years do fewer than 60 minutes of PA of moderate to vigorous intensity per day and therefore
33 do not meet recommended levels of PA⁸, required to achieve health benefits⁹. Low PA levels
34 of adolescents measured in 2007 for Ecuador show a concerning picture¹⁰. Only 14.8% (± 1.4)
35 of urban adolescents and 14.9% (± 4.5) of rural adolescents were physically active for at least
36 60 minutes per day on all 7 days. The low fitness levels found in a more recent study in
37 Ecuadorian adolescents demonstrate their poor involvement in active lifestyles¹¹. In total,
38 59% of adolescents were observed to be situated below the Healthy Fitness Zone¹¹. With high
39 obesity prevalence rates (19,7%) equaling those of high-income countries¹², it is clear that
40 urgent action is required. There is a strong need for preventive strategies that target physical
41 inactivity in order to tackle the obesity epidemic¹³. However, more evidence is needed from
42 LMICs on the effectiveness of interventions for promoting PA¹⁴. This limited ability of
43 interventions to change behaviour highlights the need for more extensive research on
44 identifying factors that influence PA. These factors have complex interactions which play at
45 intrapersonal/individual (e.g. knowledge, self-efficacy) and interpersonal/environmental (e.g.
46 social support, accessibility) level¹⁵. Understanding these influences within the context of

47 LMICs, through theoretical models, could facilitate the development of effective health
48 promotion interventions. A recent review¹⁶ concluded that studies identifying correlates of PA
49 in LMICs have been increasingly conducted over the last few years, yet there is little evidence
50 available. Most of these studies focused on biological and demographic correlates and did not
51 include behavioural, psychological or social correlates. None of the studies were conducted in
52 Ecuador¹⁶. The aim of this study was to develop a conceptual framework through identifying
53 context-specific factors in Ecuadorian adolescents' PA. Focus groups were considered the
54 appropriate method to explore these factors.

55

56 **Methods**

57 Focus group protocols were developed according to methodological standards^{17,18} and were
58 approved by the Ethics Committee of the Ghent University Hospital, Belgium
59 (B67020084010; 2008/462) and Quito, Ecuador (CBM/cobi-001).

60 A double layer design was used, with setting (urban/rural) as the first layer and different
61 participant groups (adolescents/school staff/parents) as the second layer. This design allowed
62 us to triangulate multiple data sources and compare and/or verify results between these
63 different layers¹⁷. To design the focus group scripts and analyze the data, the 'Attitude, Social
64 influences and Self-efficacy' ASE-model¹⁹ and the socio-ecological model²⁰, covering both
65 individual and environmental factors, were used as a theoretical framework. The ASE-model
66 explains that the intention to engage in a certain behavior is determined by Attitudes, Social
67 Influences and Self-Efficacy¹⁹, whereas the socio-ecological model highlights the complex
68 interplay between individual, relationship, community, and societal factors which affect
69 individual health behaviors²⁰.

70 In total we carried out 20 focus groups between April and - September 2008. The number of
71 focus groups was defined prior to the start of the survey¹⁷ and considered sufficient as data
72 saturation was reached. Twelve focus groups ($N=80$) were conducted with adolescents from
73 five conveniently selected schools: 3 urban schools in Cuenca (1 of low socio-economic status
74 (SES), 2 of high SES) and 2 rural schools in Nabón (only low SES). The socio-economic
75 level of the schools was defined by the type of school, i.e. public schools were considered to
76 be low SES schools and private schools to be high. Since the level of comprehension differs
77 with age, separate homogenous focus groups were organized between adolescents aged 11-13
78 years and 14-15 years¹⁸. Adolescents (20 per school) were randomly invited and were
79 included if they returned signed parental consent forms.

80 In addition, four focus groups with parents ($N=32$) and four with school staff ($N=32$) were
81 conducted; participants were conveniently recruited in the five schools included. Eligibility
82 criteria were having a child at one of the five schools between 11 and 15 years old (not
83 necessarily a participating adolescent in the focus groups) or being employed at one of the
84 schools. School staff included teachers, principals and/or canteen staff. Prior to the focus
85 group, participants signed a written consent form and completed a socio-demographic
86 questionnaire. Participants from all groups received healthy refreshments (e.g. fruits and milk)
87 as an incentive to assist in the focus groups.

88 Focus groups were led by a trained interviewer of the research team (AO), while a silent
89 observer (RV) took field notes of the non-verbal individual behaviour and group
90 interactions^{17,18}. Throughout the discussions, the trained interviewer made efforts to involve
91 all participants. A semi-structured questioning route (adapted for adolescents, parents and
92 school staff) was developed, pre-tested and refined by the research team, soliciting
93 information about the individual and environmental factors derived from the theoretical

94 framework. Open-ended questions were followed by more specific probing questions (see
95 Appendix 1). After each focus group, a debriefing was held with the moderator and the
96 observer in order to identify issues that could have affected analysis, to reflect on the quality
97 of the field notes and share their impressions.

98

99 *Data coding and analysis*

100 Records were transcribed verbatim, translated from Spanish into English and verified by three
101 researchers (RV, AO, DP). Two investigators independently read the transcripts and identified
102 emergent themes through a deductive thematic content analysis (KVR, RV). For each
103 participant group, a codebook was developed by two researchers based on constructs from
104 both literature and our theoretical framework. The focus group results were grouped into
105 individual and environmental factors influencing PA, which were subdivided into specific
106 theoretical factors according to the behavioural models, e.g. knowledge, attitude, social
107 support. If no agreement was reached on coding, a third researcher was consulted. The
108 codebook was further validated on different transcripts and verified by a third researcher.
109 NVivo software (QSR international – version 8.0) was used to code, manage and analyze the
110 data. Summary reports were written according to queries of identified constructs and themes
111 and based on specificity, extensiveness, emotion and frequency in answers ¹⁷. Moreover,
112 focus group attributes, such as the socio-economic level, setting of the schools (rural/urban)
113 and age groups, were cross-linked with constructs and themes for each participant group. We
114 analyzed for these differences and results are presented only there where a difference was
115 observed. The non-verbal behavior, group interactions and the parent and school staff group
116 were combined in the analysis for triangulation of the data.

117

118 **Results**

119 Twelve adolescent focus groups ($N=80$, male 41.2%) were conducted and group size ranged
120 from 6-8 individuals. In addition, four focus groups with parents ($N=32$) and four with school
121 staff ($N=32$) were performed with an average group size of 8 (Table 1). Results are presented
122 below according to the structure of factors influencing physical activity behaviour and
123 illustrated with quotations in Table 2. To keep the results concise, differences in factors
124 among socio-economic levels, age groups and settings are only shown when they were
125 present.

126

127 **Individual factors affecting physical activity**

128 *Knowledge*

129 All participant groups had generally poor knowledge about PA and its importance; they were
130 aware of the health benefits of PA, but did not know how much PA - and at which level – is
131 needed to meet the PA recommendations. Importantly, most of them were not able to describe
132 the difference between performing sports and PA. In case the adolescents provided a
133 description, different opinions prevailed. Sports were referred to as a ‘hobby’, ‘game’, ‘play’
134 or ‘done for a purpose’, whereas PA was seen more as training or exercise to be in shape and
135 to be more fit. Others identified PA by naming specific sports such as using weights,
136 exercising, jogging, running or playing football. For purposes of clarity for the remainder of
137 the focus group discussion, a definition for PA was provided by the moderator after soliciting
138 participants’ views.

139

140 *Attitudes*

141 Overall, all participant groups reported a positive attitude towards PA. For the adolescent
142 groups, this was mainly related to enjoyment and having fun or to the perceived health
143 benefits associated with PA. In addition, their positive attitude towards PA was expressed by
144 how they perceived active people: ‘good’, ‘cool’, ‘healthy’ and ‘strong people’. Many
145 adolescents perceived themselves as active, but stated that they would like to be more active.
146 Nevertheless, sedentary activities were their preferred activities.

147 Parents confirmed the positive attitude of their children towards PA but stressed that variation
148 in PA, such as new sports and seasonal hypes, is vital to keep them motivated. They praised
149 PA for their children for the health benefits, social contact and prevention of boredom. In
150 addition, most parent and school staff groups recognized the popularity of sedentary activities
151 amongst adolescents as an important barrier for PA, thereby confirming the view of
152 adolescents. School staff from the high SES schools reported that adolescents at their school
153 don’t like PA, whereas those from the low SES schools mentioned positive attitudes of
154 adolescents towards PA.

155

156 *Self-efficacy*

157 The majority of adolescents felt able to perform PA or sports, but they often reported feeling
158 tired and/or lazy. Few rural adolescents reported that they would not succeed in performing
159 PA or sports. This feeling of inability was related with ‘lack of energy’, ‘no one to play with’,
160 ‘simply forgetting to be active’ or specifically to rural girls ‘not allowed to do sports’.

161

162 *Habit*

163 Adolescents reported changes in their PA compared to a younger age. Some mentioned to be
164 less active now than when they were younger, but the majority thought they were more active
165 now than before. Reasons for being more active were 'feeling stronger', 'more skilled' and
166 'less falling while running'.

167 Some school staff and parents reported a habitual pattern of being active in weekends with
168 their family.

169

170 *Perceived individual barriers*

171 Perceived barriers for PA by adolescents were primarily the lack of time and energy. Going to
172 school, doing homework and helping at home required a lot of time and energy, which made
173 them feel tired and lazy. In particular, adolescents from low SES schools felt additionally
174 constrained to perform sports by fear of injuries and lack of skills; a few of them even felt
175 embarrassed, mainly the younger adolescents (11-13 years).

176 Parents confirmed that their children lacked time or friends to play or do sports with. Perhaps
177 not surprisingly, this barrier of perceived lack of time by adolescents due to school and related
178 homework was not confirmed by the school staff.

179

180 *Subjective norm*

181 In the rural area some adolescents and parents mentioned that leisure-time PA is not for girls
182 as they need to help at home and cook. Both stressed that parents simply don't allow girls to
183 play.

184

185 **Environmental factors: Family environment**

186 *Opportunities at home* - PA at home was limited due to the lack of opportunities and
187 adolescents' preference for media use while being at home. However, some adolescents
188 reported playing with pets as a pleasurable activity, which was also confirmed as PA by the
189 parents. Nonetheless, at home often household chores such as cleaning the house are done,
190 which was surprisingly not seen as PA by the adolescents. In the rural area, adolescents felt
191 more limited to be physically active at home, since they usually have to help with farming.
192 Parents emphasized that children are also active during farming, while adolescents reported to
193 be only active during farming activities by playing football.

194

195 *Rules* - Adolescents reported a wide variety of rules on doing PA: some adolescents reported
196 they can choose the sports they like but only after doing their homework, some reported not
197 being allowed to practice every sport they would like to, and some faced restrictions regarding
198 TV-viewing and playing videogames. These restrictions were confirmed by parent groups.
199 Parents did not allow every sport as some children want to do too many activities at the same
200 time. Many parents, from both rural and urban areas, had rules on helping in household chores
201 and this was mainly over the weekend; PA was only allowed after homework and household
202 chores. In rural areas, PA was also secondary to farming activities.

203

204 *Role modeling and support* - Adolescents mentioned that they are encouraged by their family
205 to be active. However, only few mentioned their parents as those that are engaging them in
206 PA; generally other family members were perceived to be more influential.

207 Parents perceived their role in motivating their children to be active as important, but admit
208 that it is difficult to actually do this. Parents mentioned it requires a lot of energy as children's

209 PA preferences change rapidly, but when their children are active they do feel satisfied. A few
210 parents explicitly stated that they support their children. Parents from the rural area
211 recognized the need to motivate their children to be physically active, but felt constrained to
212 do so as the help from their children is needed in farming activities. According to parents,
213 peers can have a supportive role in engaging in PA together, though it's mainly to have social
214 contact with friends.

215

216 *Financial constraints* – Financial constraints to engage in PA activities, such as the fees to
217 pay in sports academies or buying a bike, were mentioned a few times by parents with a low
218 SES. Also one high SES parent mentioned that he was not being able to pay for the child's
219 preferred activities.

220

221 **Environmental factors: School environment**

222 *Opportunities at school* - Adolescents mentioned several settings for PA such as the home
223 environment, sport centres, courts and academies, but the main place where they performed
224 PA was at school. Half of the adolescents reported they were active during school breaks,
225 while the others admitted to prefer sitting and chatting. In general, adolescents reported that
226 schools had sufficient material for sports and PA. Nevertheless, adolescents from low SES
227 schools suggested that more materials or infrastructure was needed, such as volleyball nets
228 and balls, whilst adolescents from high SES schools suggested a need to improve the existing
229 infrastructure, such as more balls, more space and more courts. They also mentioned a lack of
230 parking space for bikes which prohibited them from coming to school by bike.

231 School staff from low SES schools confirmed these limitations on materials due to the
232 financial cost involved. In addition, they acknowledged the importance of school to perform

233 PA, confirming what adolescents stated. In some schools footballs and basketballs were
234 available during the break. Many afternoon/morning activities are organized in schools such
235 as dance, activities through academies, but also championships. Nevertheless participation
236 rates vary for both rural and urban schools and school staff stressed that generally only a
237 minority participates.

238

239 *Rules* - Rules at school were limited. In one school it was mentioned that kids cannot play
240 with big balls and play in trees as these were activities associated with previous injuries. At
241 Ecuadorian schools a fixed curriculum for PA lessons determined by the Ministry needs to be
242 followed. Adolescents receive two hours of PA lessons each week, mainly team sports like
243 football, basketball and volleyball as well as running and gymnastics.

244

245 *Role modeling and support* - All parents perceived the school as successful in promoting PA.
246 They admitted they should do more PA themselves and stated that some of the teachers
247 should support the adolescents more in being physically active. While they were all motivated
248 to do so, including those who weren't supporting them at the moment, they admitted that it
249 was difficult to actually do this. Some school staff members referred to the indispensable and
250 important role parents play, but stated that parents not always fulfill this role. School staff
251 from rural areas said to encourage the parents to support their children being active.

252

253 *Financial constraints* - School staff from both low and high SES mentioned to be limited by
254 the schools' economic reality and the associated financial constraints. In low SES schools,
255 financial constraints impede providing PA opportunities, facilities or even PA teachers, whilst
256 in high SES additional activities organized outside the curriculum need to be covered by

257 parents and is not included in the school fee, as they would prefer. For low SES schools
258 financial constraints were mentioned more.

259

260 **Environmental factors: Societal environment**

261 *Popular media* - Adolescents and parents mentioned adolescents' preferences for media use,
262 but didn't relate this directly to changing PA patterns. Nonetheless, school staff reported that
263 PA patterns of adolescents have become unhealthy and related this to the increased interest of
264 adolescents in sedentary activities such as TV, computers and videogames. These new and
265 highly available technologies capture the interest of children stimulating sedentary behaviour
266 and distracting them from being active. However, these changes were not only associated with
267 adolescents' behaviour, as everybody likes these media.

268

269 *New transport modes* - Moreover, a decline in walking was mentioned by school staff due to
270 new transport modes such as cars and busses, large distances to go to school and safety
271 concerns. In the rural area, this change was related to improved roads and cars becoming more
272 available, whilst in the urban area, increased insecurity and robberies enhanced car use. Some
273 rural parents mentioned that farming activities require less strength due to the technology
274 available now than when they were young and adolescents are nowadays less tough.

275

276 *Role modelling* - At the societal level, all participant groups referred to a famous Ecuadorian
277 athlete as an important role model.

278

279 **Environmental factors: Built environment**

280 *Traffic and crime concerns* - Some adolescents mentioned safety concerns, but referred more
281 to their parents' fears than their own. Parents and school staff mentioned safety concerns to a
282 higher extent. In urban areas, parents and school staff expressed their worries about the
283 dangerous traffic situation, as well as high crime rates in certain areas. They agreed that the
284 road is too dangerous for adolescents to walk or bike.

285

286 *Geographical distances* - Geographical aspects such as long distances to walk or bike to
287 school were mentioned by all three participant groups as a reason to use the car instead. In
288 addition, it was reported that there are no bike lanes.

289

290 **Conceptual framework**

291 Based on these results, a conceptual framework of all relevant factors for physical activity in
292 Ecuadorian adolescents emerged (Figure 1). The framework illustrates that environmental, as
293 well as individual factors are potentially relevant factors in explaining the level of PA in
294 Ecuadorian adolescents. Environmental factors seem to have a direct influence on PA
295 behaviour as well as indirect through individual factors. Factors such as SES and location
296 were found to have an impact on PA behaviour by affecting individual and environmental
297 factors.

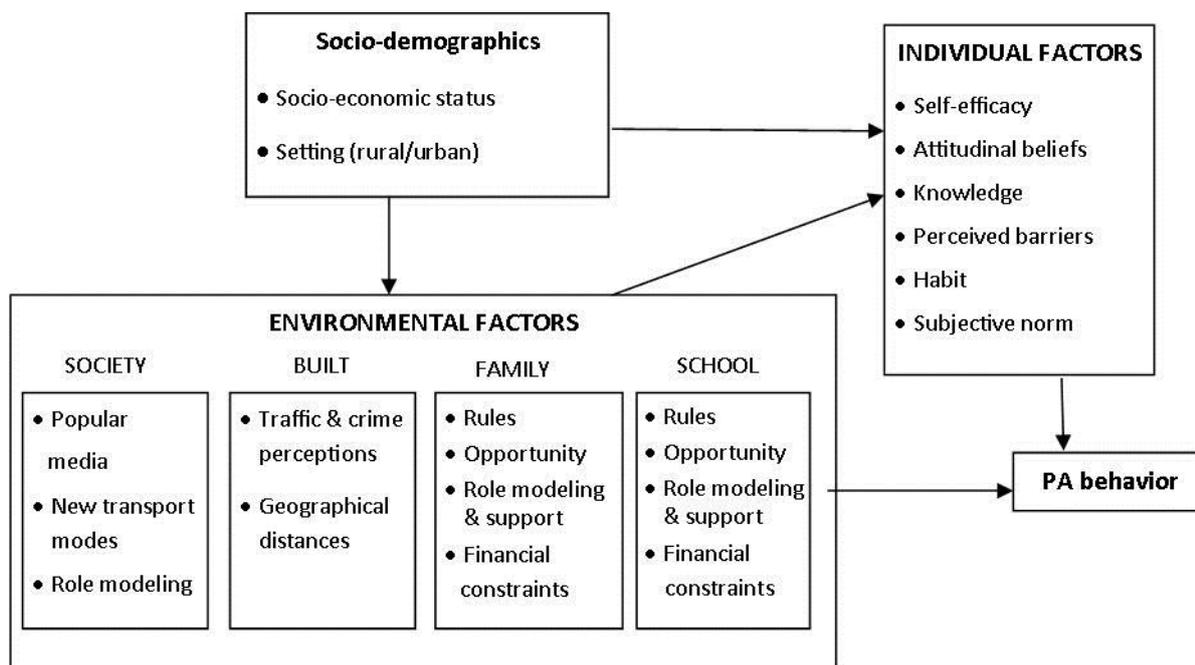


Figure 1—Physical activity factors for Ecuadorian adolescents

298

299 Discussion

300 Key individual and environmental factors in shaping Ecuadorian adolescents' PA behaviour
 301 emerged from focus group discussions with adolescents, parents and school staff. Based on
 302 the identified factors and influencing relationships, a conceptual framework was developed.
 303 This framework can be used for the design of a culturally sensitive intervention for the
 304 promotion of PA in Ecuadorian adolescents (Figure 1). The model provides points of leverage
 305 for developing a school-based intervention and can provide valuable insights to identify
 306 possible mechanisms of behaviour change. Factors at different levels played a role in
 307 influencing PA which indicates the need for multicomponent interventions, i.e. the
 308 involvement of school, family and community level, which has been shown to be an effective
 309 strategy to increase PA^{21,22}. The key role of parents has been discussed in other studies²³ but
 310 interventions targeting PA delivered by teachers were also found to be effective¹⁴.

311
312 Several factors identified in this study were quite similar to those from previous studies,
313 mainly evidence from cross-sectional studies²⁴⁻²⁶. In particular, our study results, like earlier
314 studies^{24,27}, showed that time constraints and laziness were mainly perceived as barriers to
315 PA, given the amount of household tasks and homework they need to do (or is required from
316 them) in both urban and rural areas. Moreover, even though adolescents reported positive
317 attitudes towards PA and expressed the will to be more active, all three participant groups
318 expressed the adolescents' positive attitudes towards sedentary activities (e.g. TV viewing,
319 listening to music, play station). For many adolescents, media use was even the most
320 preferred activity. Although adolescents themselves related lack of time for PA mainly to
321 overload of homework and household tasks, media use has also been found to be an important
322 factor interfering with time for PA²⁸. Objective data from the global school-based student
323 health survey demonstrate that 32.2% (± 2.0) of adolescents in urban Ecuador and 28.5%
324 (± 5.0) of rural Ecuadorian adolescents are engaging in sedentary activities for three or more
325 hours per day¹⁰. This calls for a decrease in media use, in addition to efforts to increase PA.
326 Reducing time spent on sedentary activities was previously suggested as one plausible
327 strategy, among others, to reduce physical inactivity among youth^{9,29,30}. Given that sedentary
328 behaviour is distinct from physical inactivity and reducing sedentariness does not simply
329 result into more PA³¹, efforts focusing on sedentary behaviours must go along with actions to
330 increase PA. However, very few school-based interventions in LMICs target sedentary
331 behaviours¹⁴. This is particularly concerning in the light of the ongoing shift toward more
332 sedentary lifestyles in LMICs³².

333

334 Furthermore, farming or household activities and the economic situation appeared to have an
335 impact on PA. Rural parents reported encouraging their children to be active, although they
336 found it difficult due to assistance required from their children in farming. Similarly, urban
337 parents required the need for help in household chores. Surprisingly adolescents did not
338 perceive farming or household chores as PA, even though PA was explicitly defined as
339 covering various domains (leisure-time, home-based activities, transport etc.)³³ in the
340 beginning of the focus group discussions. Greater awareness among adolescents and parents
341 that lack of time is not necessarily a barrier and that PA can be integrated into simple daily
342 routine activities, such as farming or household activities seems to be vital. In addition, forms
343 of intangible support like encouragement have been proven to have positive effects on the PA
344 behaviour of adolescents^{34,35}. Even though this association has not been found for LMICs¹⁶, it
345 seems important to motivate parents for encouraging their children.

346 Rural adolescents have been observed to be more physically fit than their urban counterparts
347 but at the same time they engaged more in sedentary activities and rural males less in
348 moderate to vigorous PA at weekends³⁶. Except for time constraints for rural adolescents to
349 engage in leisure-time PA due to household and farming activities, this may be partly
350 associated with perceived low self-efficacy and fear of injuries observed among lower SES
351 adolescents in general. Even though in this study self-efficacy did not seem to be important,
352 previous studies show strong evidence for a positive association between PA and self-
353 efficacy^{24,35}.

354

355 An important finding of this study was the crime and traffic safety concerns of parents in
356 urban areas. The high impact of environment on PA levels has been established previously^{25,37}
357 and in particular for neighbourhood safety concerns³⁸. However, most of these associations

358 are based on perceptions of environment rather than on objective measures in LMICs¹⁶.
359 Nevertheless for instance in regard to crime concerns, objective data on crime in Ecuador
360 confirm that this can be potentially influential³⁹.

361 Moreover, associations between built environment and PA levels are less strong for
362 adolescents than for adults⁴⁰. It has been shown that parents' concerns about neighbourhood
363 safety have stronger influences on children's PA than children's own views^{38,41}. This is
364 confirmed by our adolescents who referred to their parents' fears when it came to safety
365 concerns, rather than their own. Combined with the limited opportunities to be active at
366 school and at home, and the expressed need by both parents and adolescents for variety in
367 terms of PA, this offers a window of opportunity for intervention strategies. Several strategies
368 such as providing access to school facilities, providing equipment, and identifying ways to
369 promote encouragement for PA have been found to be associated with an increase in physical
370 activity levels during recess periods⁴².

371
372 As only mixed gender focus groups were organised the data could not be analysed according
373 to gender, however the results showed that there is a strong gender norm regarding
374 expectations that girls should not engage in leisure time PA. The gender norm influencing
375 girls' and women's participation in PA has been widely studied and is part of a larger debate
376 on gender empowerment⁴³. Increasingly, it is being argued to use sports participation in
377 creating gender equity and empowering women^{43,44}.

378
379 Our results should be interpreted with caution, given the focus group results represent the
380 perception of the participants and are not necessarily equal to objectively measured data. The

381 assumed relationships between influencing factors and behaviour as represented in the
382 framework, need to be tested further.

383 The number of high SES students involved in this study was small compared to low SES
384 groups, however this represents the reality of the balance in SES levels in Ecuador. Mixed
385 gender focus groups were conducted which impeded us to observe gender differences.
386 Furthermore, the importance of the reported factors for different levels of PA could not be
387 distinguished. Nevertheless, we believe all issues were raised and more importantly
388 triangulation methods enriched and confirmed our data through the solicitation of multiple
389 data sources as well as analysis of our data by two independent researchers.

390

391 **Conclusion**

392 Several cultural-specific and setting-specific factors emerged to explain PA behaviour in
393 Ecuadorian adolescents. Our results indicated that a multicomponent intervention approach
394 targeting schools, parents and community is essential, since potential factors at these multiple
395 levels were identified. In addition, urban and rural areas, as well as SES levels, have shown to
396 differ and therefore require tailored interventions. This confirms the need to identify
397 behavioral and environmental factors prior to the development and design of a health
398 promotion intervention. A conceptual framework suggesting pathways in which factors
399 mediate and change PA behavior in Ecuadorian adolescents, emerged from our data. This
400 framework requires further validation using stronger designs.

401

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404 initial analyses.

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410

411

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413

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Table 1: Participant characteristics

Adolescents	N=80
Gender (% male)	41.2
Age (mean (SD) years)	13.7 (1.2)*
School (% public)	62.5
Setting (% urban)	50
Socio-economic level	
Low (%)	67.5
High (%)	32.5
Parents	N=32
Gender (% male)	25
Age (mean (SD) years)	41.2 (10.7)
Education	
Illiterate (%)	6.5
Primary (%)	45.2
Secondary (%)	32.3
University (%)	16.1
No. of children (mean (SD))	2.9 (1.4)
School staff	N=32
Gender (% male)	58.1
Age (mean (SD) years)	36.7 (11.0)
Experience (mean (SD) years)	7.0 (8.7)

526 * Date of birth was missing for 5 adolescents

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530 **Table 2: Quotes from adolescents, parents and school staff**

Individual Factors	Adolescents (A) Parents (P) School staff (S)
<i>Knowledge</i>	A1: "With physical activity you can make your legs stronger, all that, to be more fit, on the other hand sport is just like a hobby, not so much training" P1: "I believe ...it can be around 3 or 4 times a week. It can be the ideal to exercise" S1: "They are also active when they are studying or listening to music"
<i>Attitudes</i>	A1: Moderator: "What do you like to do the most when you are not at school?" Participants: "Watch TV"; "Play with the computer"; "Play videogames" A2: "Good attitudes, I mean, one always thinks positive about sportive people" P1: "I get crazy, now she wants to golf ..." P2: "My son does everything but he likes to hang in front of the TV or the nintendo .." S1: "Well, If talk about PA most of them are always active, some are hyperactive and they run, jump ... well they are always active" S2: "They don't like to sport ... they don't want to have physical education class"
<i>Self-efficacy</i>	A1: Moderator: "If you decide to perform PA, would you succeed?" "Yes" (All participants agree)
<i>Habit</i>	A1: "Yes, when we were younger, we used to play more ...and now not" A2: "Because when we were little we did not engage in too much activities ...we were not allowed. They say that we fell and then cried"
<i>Perceived individual Barriers</i>	A1: "At home there is not too much time to do things, we have a lot of school work and that is what we do the most." A2: "Before I used to feel lazy for running, and now ... I feel more lazy" A3: "I am shy, to be seen doing exercise" P1: "There is sometimes a lot of school work, but it is important that they study" P2: "It depends, they like to play and do things like that, they do something every afternoon..., depending on the time...they help their parents...to check the cattle"
<i>Subjective norm</i>	A1: "Because you are men ... for women it is not allowed to play, they say women have to £ play by cooking £ , that is what they say" P1: "Boys can play...But the girls, have to help at home"
Environmental factors	
<i>School opportunities</i>	A1: "A net to play volleyball ... they only put a rope" S1: "Sure, here there is no physical space, for example to play football or indoor. Kicking a ball can hit a classmate. There is no volley court"
<i>School – Support and role modelling</i>	P1: "The school influences a lot ... to perform sports every day. They promote dances to perform at school. Yes, this school helps. Teachers are good, and they influence enormously. All my children graduate from this school and they are good people."

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	S1: "Personally I feel ... how can I say? I would like to perform more PA but unfortunately ... and here we have to be honest...some teachers support so, but some teachers do not support it, they see it as wrong. Only because they make noise... and that is true, they make noise ... our infrastructure is not the optimal for the students to play."
<i>School financial constraints</i>	S1: "Just by affinity ... to have a PA teacher a salary is needed, a professional can be hired if the salary would be available ... so all the students can receive training" S2: "Therefore it obviously implies an economic cost of trainers, directors, facilitators, sport gear, infrastructure, and this is difficult for us due to our obvious economic crisis, and the school fee...especially for parents"
<i>Family opportunities</i>	A1: "At home, I sometimes play football ... I break the windows ..." P1: "Something that is fascinating is the pets, it should be a sport."
<i>Family - Rules</i>	A1: "In weekdays I must cook, clean the house" A2: "My daddy doesn't let me because they say it is exhausting, and that it takes my time for school work, or that we finish late and I sleep little" A3: "I do what I want, but first I have to do school work" P1: "We say, please fix this and after that you can go and play" P2: "From Monday to Thursday they cannot use the play station ... they cannot even see it"
<i>Family – support and role modelling</i>	P1: "I used to push them....until last year, this year I decided to let them do whatever they want.... I don't...Now I am relaxed" P2: "We like them to help at home, we don't ask them to play...we need help at the farm...with anything. It would be good that after school they can go to play, but nooo...they have to help us."
<i>Family - financial constraints</i>	P1: "My daughter loves to dance but ... I cannot afford a dance academy. She really loves that... she dances in front of the TV .. she brings her friends and they all dance ...but I cannot register on that dance school."
<i>Society – popular media</i>	A1: "I think ... not at home. Because people rarely do it at home, they play with the computer, they watch TV or things like that" S1: "Also, yes, It is not a game anymore, now everything is electronic, the cell phones, and playstation, all that. That is how it has changed, in terms of activities for leisure time. Spare time is not well used, it should be used by sport activities and physical exercise."
<i>Society – new transport modes</i>	P1 "When I was younger I used to walk 14 km and I never got sick. I never had any problem ...and I used to be thin ... well not that thin, but healthy. And now... I am fat because I don't walk. Walking is the healthiest thing especially in the morning .. this is my own experience. Nowadays we move on buses, cars ... etc."
<i>Society - role modelling</i>	A1: "We would like to be like him..." (<i>about sportsman</i>)
<i>Built environment-traffic and crime concerns</i>	A1: "They are afraid that we have an accident" P1: "We walk when we go out together these days they cannot walk around alone. I feel that we cannot let them out ... alone. I feel really scared."

<i>Built environment-geographic distances</i>	S1: "And about the walking ...it is also unsafe because they can be attacked ... and it is too far"
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Appendix 1: examples of questions and probes for each participant group

Participant Group	Questions/probes
Adolescents	<ul style="list-style-type: none"> ▪ Did someone teach you how much you should move to be healthy? <p>Probes: Who teaches you? Different persons?</p> <ul style="list-style-type: none"> ▪ What are some of the things that could help you add more physical activity into your daily life? ▪ What keeps you from being physically active?
Parents	<ul style="list-style-type: none"> ▪ What are some of the things that influence your child's physical activity levels? <p>Probes: What is the most important reason for your child to be inactive? What is the most important reason for your child to be active?</p> <ul style="list-style-type: none"> ▪ Can your child choose what he/she wants to do as a sport/activity?
School staff	<ul style="list-style-type: none"> ▪ How do you feel about the role of the school in promoting physical activity? <p>Probes: How could the school motivate the adolescents to be more active? If there are already actions undertaken, which ones are they?</p> <ul style="list-style-type: none"> ▪ Are there any rules regarding being active in the classroom or at school?

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