

1 *Type of the Paper: Article*

2 **Youth exploring the relationship between school** 3 **gardens, food literacy and mental well-being using** 4 **photovoice.**

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13 Received: date; Accepted: date; Published: date

14 **Abstract:** The goal of the project was to gain an understanding of the secondary school youth
15 experience with food literacy and school gardens on their mental well-being. Over the course of
16 five months, sixteen youth participated in a photovoice research project in which they expressed
17 their personal experiences about food and gardening through photography and writing. The
18 aspects of secondary school youths' life experiences affected by exposure to food literacy and
19 school gardens and their impact upon their well-being were identified. These included emotions
20 and feelings, having a safe place, nutrition and relaxation. The youth explicitly connected
21 relaxation with the themes of love and connectedness, growing food, garden as a place, cooking,
22 and food choices. This was linked to nature, beauty, environment and sustainability. Youth clubs or
23 groups were also identified as a key enabler for connection. Youth shared their food literacy
24 experiences, observing that their engagement improved some aspect of their mental well-being.
25 They identified food literacy and gardens as being the most important to mental well-being
26 including: connecting, personal health and personal growth. The youth recognized that connecting
27 comes from having community, relationships and respect. Fostering opportunities for food literacy
28 such as growing and preparing food contributes to resiliency.

29 **Keywords:** mental health; food literacy; photovoice
30

31 **1. Introduction**

32 The school context is seen as a setting for prevention strategies to reach many children and
33 youth at key points in their development. It is assumed that children's and young people's learning
34 influences their health behaviours and therefore what disease they develop in later life [1] however
35 the etiology of disease is both complicated and contentious [2]. What young people might have to
36 say about their health and what they might want or prefer is an equally important perspective in
37 creating spaces where health and well-being are optimized.

38 This paper reports on a study that focused on youth exploring three interrelated aspects –
39 consideration of mental health and food literacy while situated within a school garden context. The
40 opportunity offered by school gardens as green spaces is due to them being widely placed and
41 accessible for youth, particularly in the Vancouver city area. These green spaces enabled
42 experiential, problem-based education while also allowing for interactions and social engagement
43 amongst the “gardeners” [3]. Thus, engaging with green spaces supports positive mental health in
44 youth by building their resilience, sense of autonomy and positive outlook [4–5] as well as a sense of
45 inclusion and belonging. The complimentary focus on food literacy was possible due to a number of
46 the green spaces being school gardens. The youth were able to plant, cultivate, harvest and prepare

47 foods that they had grown. Food literacy is an emerging concept that requires a holistic approach
48 where understandings about food that are socially constructed and able to be shared [6–8].

49 Hands-on food education provides empowerment and skill building that can bolster resiliency
50 to support the mental well-being of students [9] and support academic development [10–11]. Local
51 school and community partners, who have worked with the authors, shared observations and
52 comments related to school connectedness, improved self-esteem, feeling safe in school gardens and
53 mental well-being about students who were involved in school garden and food literacy activities.
54 However, no local research data was available, particularly from a youth perspective.

55 In this study, photography was chosen as way to enable participating youth to investigate their
56 world, [12–14] looking for connections between school gardens and how they perceived their own
57 mental health [15]. Using an arts-based methodology for this study, specifically photovoice, was
58 predicated on the understanding that knowledge exists between and among youth in social settings
59 and that learning is the result of their interactions [16–17]. Thus, the use of photovoice enabled the
60 youth to become empowered through active involvement as co-researchers and engaging with the
61 process of developing knowledge [17] about the underlying reasons for the observations between
62 youth mental well-being and food literacy activities.
63

64 2. Materials and Methods

65 Photovoice methodology was developed by Wang and Burris [13] with the specific intent to
66 share expertise and knowledge in participatory ways and to enable people to document community
67 strengths and concerns [12,14]. The framing of photovoice as community-based participatory
68 research [18] privileged the voices of youth as they represented their experiences of the school
69 garden green space. The resultant conversations and discussions were possible because of the shared
70 experiences, respectful relationships and level of trust [18–19].

71 The research team funded a professional photographer, with experience in photovoice projects,
72 to collaborate with the primary investigator to guide planning and facilitation of youth sessions
73 around photography and writing. The photographer helped youth build skills in storytelling
74 through photography, showing examples of other photovoice projects, providing digital camera
75 equipment, training youth on how to operate the digital camera equipment, and collecting and
76 organizing their digital photographs. This process of working with youth to build their photography
77 skills and develop the technical capacity to present their views as both “competent citizens and
78 active participants” [12] (p. 152) who are engaging in transformational acts.

79 Ethics approval for this study was obtained from The University of British Columbia (UBC)
80 [H15-03101]. Permission to approach and engage with schools in Vancouver was obtained from the
81 Vancouver Board of Education. School and community partners in Vancouver recommended
82 recruiting participants from existing youth clubs and groups. Flyers were distributed in January to
83 community partners and posted at secondary schools to help with recruitment and a Youth
84 Photovoice Project Facebook page was created to share information and updates about the study.
85 Purposive sampling was used to recruit secondary school students from these sources, which
86 provided a diverse group of youth.

87 Sixteen youth, nine females and seven males, in grades nine to twelve, attended seven, one to
88 one and a half hour photography and writing sessions over a five-month period. Based on youth
89 preferences, the sessions were held primarily on a weekday after school at their own school site or
90 where their existing club or group was already convening. These sites included two secondary
91 schools, a university farm site, a community center and a neighbourhood house.

92 The youth participated in the three stages of the participatory approach of photovoice
93 methodology described by Wang and Burris [13]. The first stage is having youth take the lead in
94 selecting photographs. The second stage focused on contextualizing or providing stories about the
95 meaning behind the chosen photos. The sessions with youth included having them document their
96 reflections in personal journals and sharing some of their writing with investigators and fellow
97 youth. The third stage involved codifying or identifying themes from the research process, which

98 took place both individually with each of the investigators and then together, followed by
99 identifying and checking themes with youth co-researchers.

100 Since different methods were used to collect information to triangulate findings and increase
101 rigor and credibility a meta-analysis was facilitated. Each investigator used a holistic thematic
102 approach by independently reading the transcribed interviews, focus group transcript and youth
103 writing. One investigator utilized the *NVivo 10.0* [20] computer software and the other investigator
104 used a manual review process to develop a preliminary coding framework that emerged from the
105 data. They met several times to iteratively develop a shared list of categories, overarching themes
106 and sub-themes to enhance inter-rater reliability.

107 Based on the derived draft list of themes and categories, overarching themes were shared for
108 participant verification at a second focus group held in September to further improve inter-rater
109 reliability and verify findings with youth co-researchers. Five females and one male were in
110 attendance. Two male participants joined through a video Skype call on a mobile phone. A mind
111 mapping activity was utilized to allow youth to further refine and validate the key themes and
112 connections between themes.

113 3. Results

114 The youth and investigators identified the following three broad emergent themes related to
115 food literacy and gardens as being the most important to mental well-being; connection, personal
116 growth and personal health. Youth clubs or groups were identified as a key enabler for connection.
117 They provide diversity and contribute to hope and mindfulness. For personal health, factors
118 included emotions and feelings, having a safe place, nutrition and relaxation. Relaxation was
119 connected with the following grouped themes of: growing food, garden as a place, cooking, love and
120 food choices. This was linked to nature, beauty, environment and sustainability. In addition,
121 participants indicated a group of themes that related to those things that “change all the time”, such
122 as self-discovery, life, personal growth, slower pace, future and nurture.

123 3.1. Images and text

124 As the youth were setting up and reflecting on their photographs and text, they were asked
125 brainstorming questions as a way to help youth guide their photography and story writing. The
126 examples of questions included: *What does mental well-being mean to you?* and *What does food and*
127 *gardening mean to you?* Table 1 presents the themes, sub-themes and selections of quotes from
128 students, which emerged from the data. Participants indicated that connecting comes from having
129 community, relationships and respect.

130 **Table 1.** Examples of themes and comments

131

Theme	Sub-theme	Sample participant responses
Connection	Relationship	Well, the most I can say is I've never seen—well, like, if I have, it's very rare, but I've never seen, like, both youth and seniors working together, and it's gardening. And like, because usually when it's—when I think of teenagers, I think of people, like, using their phones every five minutes, and this is not something I saw during the times we were gardening. And so yeah, that's just something I noticed. And it was very interesting, and you need to see something like that, to see it, that gardening can do this to people.
	Community	I've seen it in gardening mostly, that people do come together of all ages. Like, you don't need a lot of experience or not a lot of knowledge to actually be able to do gardening. Like, you can just pick up and do

		<p>something in the smallest way and it can help. And you see, like, the actual growth and the actual outcome of your own efforts, so it's really rewarding.</p>
		<p>Well, I see people laughing, making jokes about small things, and just enjoying the process of gardening. It's not—it's not really actual gardening, but it's working with other people, other peers. And—yeah.</p>
	Respect	<p>I think that the biggest thing is that when you're gardening, that there's kind of like a sense of, like, no judgment of what you're doing in the moment. So you can share your opinions and really get to—get to know people from, like, a different point of view, and get to see, like, what their skills that they're good at. So in terms of mental wellbeing, I would say it really makes you find that connection of what you're good at, and makes you feel good about yourself in the end.</p>
Personal Growth	Self-discovery	<p>...You don't always have to be around others, and especially for youth, at my age or—we kind of feel the need to fit in and always be around people, like social media and things like that. But I think what's more important is, like, finding that balance in order to solve that problem, and finding that balance might mean something like gardening or, like, doing something else you love.</p>
		<p>Well, especially this age, it's just, it comes from peers, like, kind of that pressure to always fitting—to always fit in and, like, always be talking to other people, but sometimes we have to take that time off for ourselves, for, like, self-growth, and how we can still be bright and colourful just on our own. Well, it's again, like, taking time, doing things like gardening and like, finding that balance in our lives, just focusing on multiple things, not just one, in order to—in order for that self-growth to happen.</p>
		<p>...how gardening, it—there's, like—it can relate to everyday life, not—it's not just gardening.</p>
	Future	<p>I would say give the opportunity to students to actually bring out what they think is important, and to not only teach what is part of the curriculum, but something that could help nurture what they want to do in life.</p>
Personal Health	Nutrition	<p>When I started working in the garden, I started to feel this great connection with the things. I grew, and I started to care more about what I was eating.</p>
		<p>When you're the one who grew the food, like, it just adds that extra sort of excitement and makes you want to eat the food.</p>
		<p>We heal ourselves using the foods we eat." "So that's part of the problem I see, is that people don't care enough about the—about themselves and their health and the environment, the planet, because that's all connected.</p>

	Relaxation	It's therapeutic in some way actually. Like, touching the soil is actually calm—not calm—like, calming, but, like, it's nice to just garden and get your hands dirty and grow stuff and seeing it grow, watching it grow.
		[Gardening] gave me more friends I guess and it's kind of like what I said last time is [it's] like a safe place where I can escape from problems or stress that I have during school and instead I can embrace the things that make me happy.
		It calms me and allows me to think, not negatively, but logically.

132

133 The photographs taken by the youth and the accompanying texts could also be sorted according
 134 to the themes and sub-themes. The experience of being in the garden with others, thinking about the
 135 image, its composition, use of light and texture, shape and form all come together to convey the
 136 youth's impressions about food, gardening and mental well-being.

137

Table 2. Examples of images and texts

	<p>Themes Personal Growth / Self-Discovery</p> <hr/> <p>Sometimes people are in situations that force them to be alone like this strawberry. There are times in life when we might not have the most friends, but this is the perfect time for self-growth. As people, we have to remind ourselves that we don't need to be constantly around others all the time. We can be just as colourful all by ourselves and still have a berry good time.</p>
	<p>Themes Connection/Relationship/Club</p> <hr/> <p>I think it—just before, I'm kind of afraid of, like, of making new friends because I'm not really good at social. And in Carrot Club it really—I not only have the club, I also have myself to get the courage and meet new people, [some] new people.</p>
	<p>Themes Personal Health/ Emotions & Feelings</p> <hr/> <p>Gardening is an art. It takes time and care with all the heart To grow strong and bold A plant needs the touch of kind soul.</p>

138

139 The accompanying text highlights a particular experience that the young person wanted to convey
 140 about themselves and their relationships with others. Evident in these artifacts is a sense of agency
 141 [21] and personal growth due to the interactions both with the school garden as a green space and
 142 with other gardeners [19].

143 3.2. Evidence of Food Literacy

144 Food literacy is a sociocultural knowing where food-related activities are based on particular
145 understandings that are context dependent and infused with power-relations [6–7]. As a way to
146 understand what this food literacy might look like, we utilize a critical food literacy model that is a
147 multidimensional model [7]. This model was used as a way to elicit the researchers' understanding
148 about the ways the youth as participants were food literate.

149 In their discussions, the youth identified both the conversations and activities reflected in each
150 dimension of food literacy – operational, cultural and critical. For example, when youth spoke about
151 their experiences of planting, growing, harvesting and preparing food, these were aspects of the
152 operational dimension of food literacy. Such comments included:

153 *For me [I] like food workshops, we make foods; I like to make pizza, or pretzels. Pretzel is fun.*

154 *It's really about the skills, something you gonna do when you grow up.*

155 *Between cooking and gardening we use cooking more in the future because we have to eat.*

156 Youth spoke about their food experiences and how they connected to family. They drew on
157 ways of knowing, especially around traditional and healing plants, reflecting a cultural dimension of
158 food literacy. Their cultural food literacy included the retelling of experiences with family members,
159 intergenerational learning and connecting to others with expertise.

160 *A lot of the stuff [my grandfather] showed me are pretty simple things that gave me a little fed start with*
161 *teaching the kids... how to plant things, like how far do they have to be, like the spacing. Making sure that if*
162 *they have to dig something up, if there's a rock or something, try to find a way around it, not just dig the rock*
163 *out. And leave the rock somewhere else far away from the plant.*

164 *It's easier in the garden to talk about and learn about other people.*

165 *I always go with my mom to the market, like supermarket or market place, buy vegetables and rice, so I*
166 *know how to pick them. Like choosing apples or oranges as fruits, or cabbage something like that.*

167 The critical dimension was evident when the youth discussed how they connected the growing
168 of food with eating healthy or sustainable food. When engaging with this dimension youth were
169 able to connect their experiences to what is occurring elsewhere. For instance, their efforts to
170 produce food was scaled up in their imaging of what those who work on the land would need to do
171 to feed communities.

172 *Although it's fun and rewarding, it's a lot of work to grow something and when it dies you're kind of a*
173 *little bit sad but it's part of it I guess and you kind of realize how much work it is, like to grow one plant, it took*
174 *us a lot of work and then I think about the farmers that do like that for a living and then I'm like, you kind of*
175 *realize how hard they work and you appreciate it more.*

176 Drawing on Cullen et al.'s [22] definition of food literacy, these quotes from the youth about
177 their thinking around their food experiences demonstrated an understanding of what is involved in
178 growing and preparing food. They also highlighted the relationship between food and the youth, as
179 evidenced in 'real' social contexts, which supported their connectedness with others. This food
180 literacy is concerned with the interactions and concepts about food, typified as farm to table and
181 how it has meaning in daily life [22–23]. The very processes of producing and preparing food for
182 consumption are implicated with physical, emotional and mental health.

183 4. Discussion

184 This research contributes to the data that investigated the relationship between school gardens,
185 food literacy and student mental health. All of the youth shared that their food literacy experiences
186 improved some aspect of their mental well-being. The research provided an in-depth understanding
187 of the intersection of mental health and food literacy from a youth's perspective. All youth shared
188 that their food literacy experiences improved some aspect of their mental well-being that included
189 building their confidence, resiliency and sense of self-mastery. Seventy-five percent of Vancouver
190 public schools have food gardens, which can provide opportunities to be outside and be involved
191 with hands-on, interactive learning. Fostering opportunities for food literacy such as growing and
192 preparing food could help build resiliency. These strategies can build a supportive environment
193 around mental health promotion in schools [24]. The school garden can be used to promote physical

194 activity, mental health and well-being, neighbourhood connections [3,14], as well as cross-curricular
195 and inquiry-based learning and educational outcomes [3]. The attention restoration theory explains
196 the link between spending time in nature such as the school garden with being able to concentrate
197 better [25]. This is supported by the qualitative research by Chawla et al. [26], which involved youth
198 in gardening programs.

199 The Comprehensive School Health (CSH) framework is recognized internationally and is used
200 by public health practitioners and school stakeholders in Vancouver. The framework helps to build
201 sustainable changes in school culture that support the health, learning and well-being of students.
202 Storey et al. [25] identified core conditions for CSH implementation that include students as change
203 agents, school-specific autonomy, demonstrated administrative leadership, dedicated champion to
204 engage school staff, community support, evidence and professional development. The contextual
205 conditions of time, funding and project supports, readiness and prior community connectivity
206 influence the capability of the core conditions to be achieved. The current study addressed the core
207 conditions of secondary school students as change agents and generated evidence from the local
208 school district setting. This supports Wang and her colleagues' [12–14] recommendations for action
209 based on findings from photovoice projects. The action part of the process for the present study is
210 ongoing and has involved two public art gallery exhibitions; mobile displays at school board lobby,
211 a secondary and elementary school; sharing research summaries with the funding group and fellow
212 researchers, school board Research Committee, school board Sustainability Manager and
213 Coordinator; an oral presentation at a university dietetic intern research symposium; a poster
214 presentation at a regional health authority workshop for dietitians and part of a walking tour at a
215 national Dietitians of Canada conference.

216 The use of a research method with a qualitative focus and the resultant small sample size meant
217 that the specific findings are not intended to be generalized beyond the study participants and
218 localized context. However, the general findings may be applicable to other secondary school youth
219 involved in food literacy, in particular school gardens and related school and community activities.
220 Further research on the long-term impact of this photovoice research project on school community
221 food literacy activities is warranted.

222 The intention of this project was to engage with youth as co-researchers to explore the
223 relationship between their well-being and green spaces such as school gardens. Thus, there was an
224 exploration of engaging with green spaces that both supported mental health but also supported the
225 development of food literacy. From this project, the following are recommendations for further
226 research. Addressing how

- 227 • Food literacy in a cultural context such as growing and preparing food can build resiliency;
- 228 • School food gardens can promote both cross-curricular learning and inquiry-based learning; and
- 229 • Incorporating the perspective of youth can impact their sense of connectedness and engagement with
230 learning.

231 These ideas are encompassed in the following thoughts from a Grade 12 participant in the research:

232 *I would say give the opportunity to students to actually bring out what they think is important, and to not*
233 *only teach what is part of the curriculum, but something that could help nurture what they want to do in life.*

234 Photovoice is an adaptable, qualitative, community-based participatory research method that
235 can be used by public health practitioners to gain an in-depth understanding of client experiences in
236 order to support their health and well-being. The findings suggest further research possibilities for
237 working with youth around mental health and food literacy.

238

239 **Author Contributions:** Conceptualization, V.L. K.Ro. and K.Re.; methodology, K.Ro. and K.Re.; formal
240 analysis, V.L. K.Ro. and K.Re.; writing—review and editing, V.L. K.Ro. and K.Re.; funding acquisition, V.L. and
241 K.Ro.

242 **Funding:** This research was supported by a VCH Research Institute Research Challenge grant, funded by the
243 Robert H.N. Ho Enhancing Patient Care Fund.

244 **Acknowledgments:** In this section you can acknowledge any support given which is not covered by the author
245 contribution or funding sections. This may include administrative and technical support, or donations in kind
246 (e.g., materials used for experiments).

247 **Conflicts of Interest:** The authors declare no conflict of interest

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