WEBVTT

1 00:00:01.039 --> 00:00:03.960 <v Presenter>I'm an Associate Professor of Epidemiology</v>

2 00:00:03.960 --> 00:00:05.340 at the Yale School of Public Health,

3 00:00:05.340 --> 00:00:07.200 as well as the school's Associate Dean

4 00:00:07.200 --> 00:00:09.930 for Diversity, Equity and Inclusion.

5 00:00:09.930 --> 00:00:11.910 It is my pleasure to step in

6 00:00:11.910 --> 00:00:13.740 for Professor Donna Spiegelman today

7 00:00:13.740 --> 00:00:17.776 to introduce our speaker, Dr. Lingrui Liu.

8 00:00:17.776 --> 00:00:19.560 Before I do that though,

9 00:00:19.560 --> 00:00:22.200 I'd like to acknowledge that today's seminar is sponsored

10 00:00:22.200 --> 00:00:25.380 by both the Yale Center for Methods and Implementation

11 00:00:25.380 --> 00:00:27.630 and Prevention Science, or CMIPS

12 00:00:27.630 --> 00:00:30.930 and the Yale Center for Implementation Science.

13 00:00:30.930 --> 00:00:32.940 Based at the Yale School of Health,

14 00:00:32.940 --> 00:00:35.070 CMIPS develops and disseminates

15 00:00:35.070 --> 00:00:37.977 innovative methodological approaches

16 00:00:37.977 --> 00:00:40.410 to address implementation gaps

17 00:00:40.410 --> 00:00:42.720 and improve public health worldwide,

18 00:00:42.720 --> 00:00:44.580 strategically selecting the issues

19 00:00:44.580 --> 00:00:47.580 that carry the greatest burden and hold the greatest promise

20 00:00:47.580 --> 00:00:50.490 for amelioration right now.

21 00:00:50.490 --> 00:00:52.260 If you would like to be informed

22 00:00:52.260 --> 00:00:54.420 about future CMIPS seminars,

23 00:00:54.420 --> 00:00:56.550 please let William Tutle know in the chat

24 00:00:56.550 --> 00:00:58.713 and he will add you to the CMIPS listserv.

25 00:00:59.640 --> 00:01:02.130 Based at the Yale School of Medicine,

26 00:01:02.130 --> 00:01:05.880 YCIS accelerates the late stage translation

27 00:01:05.880 --> 00:01:08.850 of evidence-based treatments, practices and policies

28 00:01:08.850 --> 00:01:09.960 to improve the health

29 00:01:09.960 --> 00:01:12.600 of the residents of New Haven and beyond.

30 00:01:12.600 --> 00:01:15.090 Its Yale Scholars and Implementation Science,

31 00:01:15.090 --> 00:01:18.870 or YSIS program is the training core of the center.

32 00:01:18.870 --> 00:01:21.030 YCIS is funded by a five-year

33 00:01:21.030 --> 00:01:24.240 National Heart, Lung and Blood Institute K-12 award

34 00:01:24.240 --> 00:01:26.910 and is designed to train junior faculty

35 00:01:26.910 --> 00:01:28.350 and postdoctoral fellows

36 00:01:28.350 --> 00:01:32.103 in late stage dissemination and implementation science.

37 00:01:33.300 --> 00:01:34.920 Turning to our speaker today,

38 00:01:34.920 --> 00:01:38.130 Dr. Lingrui Liu is an associate research scientist

39 00:01:38.130 --> 00:01:42.030 in the Department of Health Policy and Management at YSPH

40 00:01:42.030 --> 00:01:45.420 as well as a K-12 EL Scholar Implementation Science

41 00:01:45.420 --> 00:01:47.880 at the Yale Center for Implementation Science

42 00:01:47.880 --> 00:01:50.790 and a fellow at CMIPS.

43 00:01:50.790 --> 00:01:53.730 Her research focuses on healthcare management

44 00:01:53.730 --> 00:01:56.910 and organizational studies, healthcare systems,

45 00:01:56.910 --> 00:01:59.910 quality improvement, patient safety,

46 00:01:59.910 --> 00:02:03.270 decision science and implementation science.

47 00:02:03.270 --> 00:02:06.870 Dr. Liu received has received national recognition

48 00:02:06.870 --> 00:02:08.430 for her work, including awards

49 00:02:08.430 --> 00:02:12.030 from the Academy of Management and Academy Health.

50 00:02:12.030 --> 00:02:14.910 Dr. Liu received her doctorate from Harvard University

51 00:02:14.910 --> 00:02:18.540 in Health Systems, Economics and Decision Science.

52 00:02:18.540 --> 00:02:19.747 The title of her talk today is,

53 00:02:19.747 --> 00:02:22.020 "Qualitative Comparative Analysis:

54 00:02:22.020 --> 00:02:25.830 Applying to Research on Public Health Interventions."

55 00:02:25.830 --> 00:02:27.393 Welcome Ling, over to you.

56 00:02:28.230 --> 00:02:30.480 <v Dr. Liu>Thank you Matt and thank you William,</v>

57 00:02:30.480 --> 00:02:34.470 and also Donna for having me today,

58 00:02:34.470 --> 00:02:38.040 have this opportunity to present

59 00:02:38.040 --> 00:02:40.623 the qualitative comparative analysis,

60 00:02:41.544 --> 00:02:45.780 relative new methodology to public health.

61 00:02:45.780 --> 00:02:48.150 And I consider this opportunity

62 00:02:48.150 --> 00:02:53.150 as a way to discuss with our scholars

63 00:02:57.199 --> 00:02:59.670 and also broader the community,

64 00:02:59.670 --> 00:03:02.490 to explore the utility of this method

65 00:03:02.490 --> 00:03:07.490 in public health, in intervention, evaluative science.

66 00:03:09.818 --> 00:03:13.950 And I am not expecting to use this opportunity

67 00:03:13.950 --> 00:03:16.143 as an education of this method,

68 00:03:18.884 --> 00:03:22.330 like within this 30 or 40 minutes.

69 00:03:26.190 --> 00:03:30.030 And so today, I am going to introduce

70 00:03:30.030 --> 00:03:35.030 this new method to you and also discuss about the literature

71 00:03:35.607 --> 00:03:39.690 and the discussion of the utility of QCA methodology

72 00:03:39.690 --> 00:03:41.400 in implementation sense.

73 00:03:41.400 --> 00:03:46.400 And lastly, I will use empirical study from my work,

74 00:03:47.760 --> 00:03:50.880 set as an example to show a little bit

75 00:03:50.880 --> 00:03:55.470 about my experienced business method.

76 00:03:55.470 --> 00:03:56.553 So what is QCA?

77 00:03:58.779 --> 00:04:03.360 So in one short sentence, it uses Boolean logic

78 00:04:03.360 --> 00:04:06.240 to identify all possible combinations

79 00:04:06.240 --> 00:04:09.270 of variables, conditions.

80 00:04:09.270 --> 00:04:13.470 It's a QCA terminology that influences the outcome,

81 00:04:13.470 --> 00:04:17.280 and also as scholars and we are very curious

82 00:04:17.280 --> 00:04:19.830 about the receptiveness of this matter

83 00:04:19.830 --> 00:04:22.620 and what are the publication opportunities

84 00:04:22.620 --> 00:04:24.510 of using this method.

85 00:04:24.510 --> 00:04:26.370 And the good news,

86 00:04:26.370 --> 00:04:31.370 that it welcomes for growing opportunities on conferences

87 00:04:31.470 --> 00:04:35.024 and also the publications in journals

88 00:04:35.024 --> 00:04:39.162 that have been majorly published in business,

89 00:04:39.162 --> 00:04:41.520 management, political science,

90 00:04:41.520 --> 00:04:44.640 and also is emerging in public health

91 00:04:44.640 --> 00:04:47.340 and health services research journals.

92 00:04:47.340 --> 00:04:52.110 But we also acknowledge the challenges exist,

93 00:04:52.110 --> 00:04:55.770 that's mostly in how to visualize

94 00:04:55.770 --> 00:04:58.980 the findings from the QCA and how to interpret

95 00:04:58.980 --> 00:05:03.437 and how to communicate this non-QCA experts

96 00:05:04.920 --> 00:05:07.623 in our scholarship.

97 00:05:10.650 --> 00:05:15.650 And here, I cite a figure from the latest math book

98 00:05:18.180 --> 00:05:21.653 from Melloo and he is based in Europe

99 00:05:24.480 --> 00:05:28.650 and so his book has summarized

100 00:05:28.650 --> 00:05:31.900 the recent journal articles published on QCA

101 00:05:32.880 --> 00:05:37.226 and you can see that public health is emerging,

102 00:05:37.226 --> 00:05:41.013 but it is still relatively new.

103 00:05:42.420 --> 00:05:47.420 And here, I would like to summarize three main features

104 00:05:47.880 --> 00:05:49.950 of the QC methodology

105 00:05:49.950 --> 00:05:54.090 and I first consider it is a mixed method

106 00:05:54.090 --> 00:05:57.990 that bridges the qualitative and quantitative analysis.

107 00:05:57.990 --> 00:06:01.710 So it's a non-additive and nonlinear method

108 00:06:01.710 --> 00:06:04.440 that is to identify all the combinations

109 00:06:04.440 --> 00:06:08.280 of necessary and sufficient conditions,

110 00:06:08.280 --> 00:06:10.770 the factors for an outcome.

111 00:06:10.770 --> 00:06:15.770 And so for using QCA, it requires the researchers

112 00:06:16.920 --> 00:06:20.310 to have the familiarity of these cases

113 00:06:20.310 --> 00:06:24.540 to have the in-depth knowledge of your cases,

114 00:06:24.540 --> 00:06:27.840 but also it's enables the researchers

115 00:06:27.840 --> 00:06:30.690 to examine the cross-case patterns.

116 00:06:30.690 --> 00:06:35.690 So it acknowledges the diversity and also heterogeneity

117 00:06:36.540 --> 00:06:39.090 of the research study,

118 00:06:39.090 --> 00:06:44.010 with regard that it allows the researchers to identify

119 00:06:44.010 --> 00:06:46.860 what are the different solutions

120 00:06:46.860 --> 00:06:50.580 of different combinations of the conditions

121 00:06:50.580 --> 00:06:53.823 for the occurrence of the outcome of your interest.

122 00:06:54.810 --> 00:06:59.810 And second feature, I think is important to understand QCA

123 00:07:00.270 --> 00:07:04.860 is to assess the sufficient and necessary conditions

124 00:07:04.860 --> 00:07:07.680 for the success or failure of the outcome.

125 00:07:07.680 --> 00:07:09.420 So it's very different

126 00:07:09.420 --> 00:07:14.420 from our conventional statistic influence techniques.

127 00:07:14.880 --> 00:07:19.880 And by looking at the sufficient and necessary conditions

128 00:07:20.760 --> 00:07:23.400 for the success or failure of the outcomes,

129 00:07:23.400 --> 00:07:28.400 it provides researchers or the practitioners the approach

130 00:07:30.840 --> 00:07:33.480 to identify more than one solution

131 00:07:33.480 --> 00:07:37.680 or we call recipe to an outcome.

132 00:07:37.680 --> 00:07:42.360 And also the presence or the absence of these factors

133 00:07:42.360 --> 00:07:46.380 in relation to the other conditions might be key.

134 00:07:46.380 --> 00:07:49.320 And also in QCA study

135 00:07:49.320 --> 00:07:52.740 and the specific factors explain the success

136 00:07:52.740 --> 00:07:57.360 does not imply that their absence would lead to the failure.

137 00:07:57.360 --> 00:08:02.360 And the third feature, I think is important,

138 00:08:02.460 --> 00:08:06.150 is that QCA is ideal, given the nature of this

139 00:08:06.150 --> 00:08:09.330 and the underlying logic of this matter.

140 00:08:09.330 --> 00:08:11.250 It's very ideal

141 00:08:11.250 --> 00:08:16.250 for the small to intermediate sample size research design.

142 00:08:16.440 --> 00:08:21.000 And because it's within this range, like 10 to 15 cases,

143 00:08:21.000 --> 00:08:23.970 there are often too many cases

144 00:08:23.970 --> 00:08:26.310 for researchers to keep all the knowledge

145 00:08:26.310 --> 00:08:28.110 about all the cases,

146 00:08:28.110 --> 00:08:30.060 but too few cases

147 00:08:30.060 --> 00:08:33.033 for most conventional statistical techniques.

148 00:08:34.170 --> 00:08:39.170 And here I share a few important methodology references,

149 00:08:39.660 --> 00:08:41.460 which may be helpful

150 00:08:41.460 --> 00:08:46.053 if some of you are interested to read and explore more.

151 00:08:47.340 --> 00:08:51.450 And so come to our interest,

152 00:08:51.450 --> 00:08:54.060 what is the utility of this method

153 00:08:54.060 --> 00:08:56.460 in implementation science?

154 00:08:56.460 --> 00:08:58.350 And I found two literature

155 00:08:58.350 --> 00:09:02.910 which I found they are very useful for me to understand

156 00:09:02.910 --> 00:09:05.850 what has been done in this area.

157 00:09:05.850 --> 00:09:09.600 And so one is the systematic review by Hanckel

158 00:09:09.600 --> 00:09:14.250 and which is just published is out at BMC Public Health

159 00:09:14.250 --> 00:09:18.930 and the other report paper

160 00:09:18.930 --> 00:09:22.950 and it has been using, apply the QCA

161 00:09:22.950 --> 00:09:27.542 to identify the features of the strategies

162 00:09:27.542 --> 00:09:30.000 related to mental health care

163 00:09:30.000 --> 00:09:34.470 for children and adolescents by the RTI

164 00:09:34.470 --> 00:09:39.060 and it has been published as agency for healthcare

165 00:09:39.060 --> 00:09:42.570 and quality research publication series.

166 00:09:42.570 --> 00:09:46.100 So I think those two are very useful

167 00:09:46.100 --> 00:09:48.033 if you want to read more.

168 00:09:49.830 --> 00:09:53.460 So here, just to summarize,

169 00:09:53.460 --> 00:09:56.880 and in existing literature

170 00:09:56.880 --> 00:10:00.870 so the selection criteria have been used

171 00:10:00.870 --> 00:10:05.100 as published in English and up to December 2019

172 00:10:05.100 --> 00:10:10.100 and there are a total of 27 papers used QCA

173 00:10:11.160 --> 00:10:15.240 in evaluating the public health interventions.

174 00:10:15.240 --> 00:10:19.590 And here are a few domains I list out,

175 00:10:19.590 --> 00:10:24.150 like nutrition, obesity, health equality,

176 00:10:24.150 --> 00:10:29.010 community engagement and also chronic condition management.

177 00:10:29.010 --> 00:10:31.740 And so here, I want to show you

178 00:10:31.740 --> 00:10:34.260 the sample research questions

179 00:10:34.260 --> 00:10:36.930 or rationale for using the QCA

180 00:10:36.930 --> 00:10:40.620 that you may be interested to consider

181 00:10:40.620 --> 00:10:44.610 whether QCA's potential approach for you to use

182 00:10:44.610 --> 00:10:47.490 in your research or analyzing your data.

183 00:10:47.490 --> 00:10:49.680 So the simple research questions,

184 00:10:49.680 --> 00:10:53.947 you can see that QCA also answers questions,

185 00:10:53.947 --> 00:10:56.580 "What combinations of the components

186 00:10:56.580 --> 00:10:58.950 might serve as recipes for success."

187 00:10:58.950 --> 00:11:03.950 Of the outcome or if you are interested to identify

188 00:11:04.440 --> 00:11:07.200 the critical features or characteristics

189 00:11:07.200 --> 00:11:10.170 of the implementation program

190 00:11:10.170 --> 00:11:14.670 that leads to the successful implementation outcomes

191 00:11:14.670 --> 00:11:18.540 or if you are interested to identify

192 00:11:18.540 --> 00:11:23.540 what are the necessary or sufficient conditions or factors

193 00:11:24.360 --> 00:11:27.960 that are key to the implementation

194 00:11:27.960 --> 00:11:30.273 of this public health intervention.

195 00:11:31.350 --> 00:11:36.180 And also I want to say the QCA is mostly used

196 00:11:39.180 --> 00:11:43.380 in the description or explanation studies.

197 00:11:43.380 --> 00:11:46.161 So in the description studies,

198 00:11:46.161 --> 00:11:48.820 it's very straightforward QCA,

199 00:11:48.820 --> 00:11:52.386 you can use QCA to summarize the patterns

200 00:11:52.386 --> 00:11:56.280 across your cases

201 00:11:56.280 --> 00:12:01.280 or used in explanation studies that help you test

202 00:12:01.830 --> 00:12:06.660 your existing hypothesis and choose to test out

203 00:12:06.660 --> 00:12:10.050 whether your empirical cases can be reflected

204 00:12:10.050 --> 00:12:15.050 by some or any combinations of the factors

205 00:12:15.750 --> 00:12:17.943 from this existing theory.

206 00:12:19.260 --> 00:12:22.770 And here is the QCA research cycle.

207 00:12:22.770 --> 00:12:27.317 So it starts to pose the research problem

208 00:12:28.770 --> 00:12:31.202 and ask the research question

209 00:12:31.202 --> 00:12:35.280 and to figure out the scope of your research question

210 00:12:35.280 --> 00:12:39.540 and then use the existing theories

211 00:12:39.540 --> 00:12:43.620 or like the empirical evidence,

212 00:12:43.620 --> 00:12:48.620 to consider to select which cases into your study

213 00:12:50.610 --> 00:12:54.090 and then you will need to select the conditions,

214 00:12:54.090 --> 00:12:56.370 like conditions are the factors,

215 00:12:56.370 --> 00:12:59.940 you can under consider those are the factors

216 00:12:59.940 --> 00:13:04.940 and then the key steps are to calibrate the data

217 00:13:05.760 --> 00:13:08.540 and to conduct the analysis

218 00:13:13.710 --> 00:13:16.500 to identify the necessary conditions

219 00:13:16.500 --> 00:13:19.590 and also the sufficient conditions.

220 00:13:19.590 --> 00:13:24.590 And the full process is an iterative process

221 00:13:24.660 --> 00:13:28.860 that you will need to come forth and back

222 00:13:28.860 --> 00:13:33.860 and to adjust with the scope of your research question

223 00:13:36.240 --> 00:13:41.240 and also the selection of cases and the thresholds

224 00:13:41.640 --> 00:13:46.640 and the decision rules for calibrating your data sets.

225 00:13:48.900 --> 00:13:51.390 And so the strengths and weakness

226 00:13:51.390 --> 00:13:56.390 of the QCA implementation science has been discussed

227 00:13:57.030 --> 00:14:00.660 in a way that it provides a systematic approach

228 00:14:00.660 --> 00:14:03.450 for understanding the mechanisms that work

229 00:14:03.450 --> 00:14:06.630 in implementation across the context.

230 00:14:06.630 --> 00:14:09.420 And the weakness however have been reported

231 00:14:09.420 --> 00:14:12.390 related to the data availability limitation,

232 00:14:12.390 --> 00:14:15.730 especially on ineffective interventions

233 00:14:17.490 --> 00:14:21.153 And the software packages are evolving,

234 00:14:22.500 --> 00:14:24.480 still in development,

235 00:14:24.480 --> 00:14:29.480 but a few packages are major and ready for use

236 00:14:29.670 --> 00:14:34.670 and you can go to this website for a full list,

237 00:14:34.890 --> 00:14:39.172 but for the major softwares have been developed

238 00:14:39.172 --> 00:14:43.200 as the FSQCA, QCA software

239 00:14:43.200 --> 00:14:46.320 and also there are a few packages developed

240 00:14:46.320 --> 00:14:50.193 on our environment that are for use.

241 00:14:51.300 --> 00:14:55.230 And here I want to just show a few examples

242 00:14:55.230 --> 00:14:57.810 of visualizing the QCA findings.

243 00:14:57.810 --> 00:15:01.950 And so, in the existing literature

244 00:15:01.950 --> 00:15:06.480 I found that the Venn diagram and also the chart table

245 00:15:06.480 --> 00:15:11.480 have been mostly used and again it's evolving

246 00:15:11.550 --> 00:15:16.550 and so scholars and researchers are still exploring

247 00:15:17.520 --> 00:15:22.520 what are the most efficient ways to communicate

248 00:15:23.970 --> 00:15:28.970 with our audience about the findings from the QCA study.

249 00:15:29.790 --> 00:15:34.450 So here I want to use one example study from my work

250 00:15:38.400 --> 00:15:42.570 that I collaborated with my colleagues

251 00:15:42.570 --> 00:15:45.600 and we use data from primary care practices

252 00:15:45.600 --> 00:15:49.620 to explore the system features of primary care practice

253 00:15:49.620 --> 00:15:52.710 that promotes better provider experience.

254 00:15:52.710 --> 00:15:56.760 And this work had been variously published

255 00:15:56.760 --> 00:15:58.830 at Academy of Management

256 00:15:58.830 --> 00:16:01.383 and also Healthcare Management Review.

257 00:16:04.650 --> 00:16:05.890 So in this study

258 00:16:07.770 --> 00:16:12.240 we focus on the providers in primary care practices

259 00:16:12.240 --> 00:16:16.470 and we know that the primary care providers also experience

260 00:16:16.470 --> 00:16:19.170 low rates of clinical work satisfaction

261 00:16:19.170 --> 00:16:21.420 and high rates of burnout

262 00:16:21.420 --> 00:16:25.800 and the poor satisfaction may adversely affect the quality

263 00:16:25.800 --> 00:16:28.770 of care they deliver to their patients

264 00:16:28.770 --> 00:16:32.880 and adversely related to patient outcomes

265 00:16:32.880 --> 00:16:35.280 and patient experience.

266 00:16:35.280 --> 00:16:40.280 And what have been not exams or studies much

267 00:16:41.040 --> 00:16:45.000 is what are the system level features

268 00:16:45.000 --> 00:16:47.490 affecting the provider's satisfaction

269 00:16:47.490 --> 00:16:51.090 in their clinical work practice?

270 00:16:51.090 --> 00:16:55.027 So in this study we asked a research question,

271 00:16:55.027 --> 00:16:58.410 "Which system features and in what combinations

272 00:16:58.410 --> 00:17:03.246 of this features can help to improve primary care provider's

273 00:17:03.246 --> 00:17:05.730 clinical work satisfaction?"

274 00:17:05.730 --> 00:17:08.260 And this study was conducted in collaboration

275 00:17:10.593 --> 00:17:14.700 with 19 Harvard affiliate primary care practices

276 00:17:14.700 --> 00:17:19.050 and we surveyed a total of 19 managers

277 00:17:19.050 --> 00:17:24.050 and a total of 854 primary care providers

278 00:17:25.290 --> 00:17:27.210 completed the survey.

279 00:17:27.210 --> 00:17:31.230 And for the managers of the survey and interview,

280 00:17:31.230 --> 00:17:36.230 one manager of each of these 19 primary care practice.

281 00:17:38.070 --> 00:17:41.587 Our hypothesis is to look

282 00:17:43.290 --> 00:17:47.100 at our automated outcome of increase, the system outcome,

283 00:17:47.100 --> 00:17:50.820 providers clinical work satisfaction,

284 00:17:50.820 --> 00:17:55.690 and this outcome is positively related,

285 00:17:55.690 --> 00:18:00.303 as the system features of primary care practices

286 00:18:00.303 --> 00:18:02.880 that include the team dynamics

287 00:18:02.880 --> 00:18:06.300 and provider perceptions of safety culture

288 00:18:06.300 --> 00:18:10.200 and also the care coordination among the providers

289 00:18:10.200 --> 00:18:12.363 to their patient care.

290 00:18:13.230 --> 00:18:18.230 And further, the hypothesis is that the enabling functions

291 00:18:20.160 --> 00:18:22.260 of these primary care practices,

292 00:18:22.260 --> 00:18:24.990 including operational functions,

293 00:18:24.990 --> 00:18:27.210 that goes into eight domains,

294 00:18:27.210 --> 00:18:32.210 and also the health information technology HIT functions

295 00:18:32.640 --> 00:18:37.640 are positively related with each of our system features,

296 00:18:38.700 --> 00:18:42.150 the overall team dynamics,

297 00:18:42.150 --> 00:18:45.330 the provider perceptions of safety culture

298 00:18:45.330 --> 00:18:49.083 and also the care coordination among providers.

299 00:18:50.130 --> 00:18:54.150 And within the operational care process functionality

300 00:18:54.150 --> 00:18:59.150 of the practices, we categorize into eight domains.

301 00:18:59.430 --> 00:19:03.030 So including appointment and referral system

302 00:19:03.030 --> 00:19:07.260 for high risk patients and also for routine patients,

303 00:19:07.260 --> 00:19:09.780 abnormal test result management,

304 00:19:09.780 --> 00:19:12.300 cancer screening for high risk patients

305 00:19:12.300 --> 00:19:14.460 and also for routine patients,

306 00:19:14.460 --> 00:19:17.160 patient center care, patient safety

307 00:19:17.160 --> 00:19:21.870 and care transitions across the primary care practice

308 00:19:21.870 --> 00:19:25.080 and emergency departments or the hospitals

309 00:19:25.080 --> 00:19:28.240 or the other specialist departments

310 00:19:29.280 --> 00:19:34.280 and the data, so we use the self-assessment service

311 00:19:34.410 --> 00:19:39.410 for primary care providers variables,

312 00:19:39.870 --> 00:19:44.870 including the clinical work satisfaction and team dynamics,

313 00:19:44.970 --> 00:19:49.050 provider perceptions of safety culture and care coordination

314 00:19:49.050 --> 00:19:52.440 among the providers towards patient care.

315 00:19:52.440 --> 00:19:54.600 And for enabling functions,

316 00:19:54.600 --> 00:19:59.600 they surveyed and interviewed the managers of the practice

317 00:19:59.612 --> 00:20:02.490 on a total of eight domains

318 00:20:02.490 --> 00:20:05.100 of the operational care process functions

319 00:20:05.100 --> 00:20:09.960 and also 42 items of HIT functions.

320 00:20:09.960 --> 00:20:14.100 And so, the method is we use the QCA

321 00:20:14.100 --> 00:20:16.770 and again it's based on Boolean logic.

322 00:20:16.770 --> 00:20:21.770 Here are just a few examples of the logic

323 00:20:22.080 --> 00:20:24.600 and logic or, or negation knots

324 00:20:24.600 --> 00:20:27.510 that is used in Boolean logic.

325 00:20:27.510 --> 00:20:31.890 And so, we use QCA to compare the cases

326 00:20:31.890 --> 00:20:33.870 to identify the combinations

327 00:20:33.870 --> 00:20:36.809 of necessary and sufficient conditions,

328 00:20:36.809 --> 00:20:40.890 the variables that trigger the outcome.

329 00:20:40.890 --> 00:20:45.890 And in QCA the key step is to construct the Truth Table.

330 00:20:46.740 --> 00:20:50.460 And here is an example from one hypothesis,

331 00:20:50.460 --> 00:20:54.507 of testing one hypothesis in our study.

332 00:20:54.507 --> 00:20:57.630 And so you can see that this is a table

333 00:20:57.630 --> 00:21:00.030 that includes eight rows

334 00:21:00.030 --> 00:21:04.620 and so the table is a two case power table

335 00:21:04.620 --> 00:21:07.653 and we have three explanatory variables here

336 00:21:07.653 --> 00:21:09.270 and one outcome.

337 00:21:09.270 --> 00:21:11.820 So we have a total of eight rows

338 00:21:11.820 --> 00:21:15.314 and each row we can consider as a recipe

339 00:21:15.314 --> 00:21:20.314 that's a combination of the logically possible conditions.

340 00:21:21.240 --> 00:21:24.360 And the one indicates the presence

341 00:21:24.360 --> 00:21:28.380 of this factor in this recipe

342 00:21:28.380 --> 00:21:31.920 and the zero indicates the absence of this factor

343 00:21:31.920 --> 00:21:33.123 in this recipe.

344 00:21:35.342 --> 00:21:39.030 Then the other main methodology

345 00:21:39.030 --> 00:21:42.590 is to use the Quine-McCluskey algorithm

346 00:21:44.010 --> 00:21:49.010 to reduce the roles of the Truth Tables to bring equations

347 00:21:49.890 --> 00:21:52.170 and to minimize the combinations

348 00:21:52.170 --> 00:21:55.173 which yields the prime recipes.

349 00:21:56.100 --> 00:22:00.090 And QCA uses two goodness-of-fit statistics

350 00:22:00.090 --> 00:22:03.160 and what is consistency?

351 00:22:03.160 --> 00:22:06.840 So it's range from zero to one

352 00:22:06.840 --> 00:22:10.230 and it indicates the strength of association

353 00:22:10.230 --> 00:22:12.870 between the conditions and outcome

354 00:22:12.870 --> 00:22:16.680 and the coverage also ranges from zero to one

355 00:22:16.680 --> 00:22:21.680 and it indicates the proportion of the cases

356 00:22:21.720 --> 00:22:24.300 that are covered in a specific recipe.

357 00:22:24.300 --> 00:22:26.340 So here in our study,

358 00:22:26.340 --> 00:22:29.730 it indicates the proportion of the practice sites

359 00:22:29.730 --> 00:22:31.803 that have a specific bundle.

360 00:22:32.670 --> 00:22:37.670 Here is a example of the consistency and coverage scores

361 00:22:37.890 --> 00:22:41.193 from testing this hypothesis in our study.

362 00:22:43.050 --> 00:22:48.050 And here I want to talk again

363 00:22:48.540 --> 00:22:53.540 about a few main features of QCA method.

364 00:22:53.550 --> 00:22:57.330 So it identifies the combinations of the conditions,

365 00:22:57.330 --> 00:23:00.750 capable of yielding the same outcome

366 00:23:00.750 --> 00:23:04.800 and therefore it can be multiple pathways

367 00:23:04.800 --> 00:23:06.930 and the outcome and non-outcome

368 00:23:06.930 --> 00:23:09.060 may require different explanations.

369 00:23:09.060 --> 00:23:12.960 So it is important that you define the outcome

370 00:23:12.960 --> 00:23:14.850 in your testing,

371 00:23:14.850 --> 00:23:19.470 for example in the example which I just presented,

372 00:23:19.470 --> 00:23:24.470 is the outcome we define as grade level satisfaction

373 00:23:25.080 --> 00:23:29.820 among the primary care providers.

374 00:23:29.820 --> 00:23:34.800 So the non-outcome is the lower level satisfaction

375 00:23:34.800 --> 00:23:36.780 among the primary care providers

376 00:23:36.780 --> 00:23:41.780 and so it requests the researchers to test the separate sets

377 00:23:42.960 --> 00:23:45.270 of the combinations of the factors,

378 00:23:45.270 --> 00:23:48.870 leads to the outcome or the non-outcome.

379 00:23:48.870 --> 00:23:53.760 So it contrasts with the next effects thinking

380 00:23:53.760 --> 00:23:55.800 that usually have been applied

381 00:23:55.800 --> 00:24:00.060 in conventional statistical techniques.

382 00:24:00.060 --> 00:24:02.580 And in this study using the QCA,

383 00:24:02.580 --> 00:24:06.810 the rationale for choosing QCA is that it enable us

384 00:24:06.810 --> 00:24:10.170 to identify the system level characteristics

385 00:24:10.170 --> 00:24:13.293 that influence the provider experience.

386 00:24:15.840 --> 00:24:19.983 And the findings, so the first task,

387 00:24:21.390 --> 00:24:24.690 the contribution of each system features

388 00:24:24.690 --> 00:24:27.780 to our system outcomes.

389 00:24:27.780 --> 00:24:30.840 The team dynamics provide a perception

390 00:24:30.840 --> 00:24:34.380 of safety culture and peer coordination among providers.

391 00:24:34.380 --> 00:24:37.713 Each of those three system features

392 00:24:37.713 --> 00:24:39.990 with the outcome of increase,

393 00:24:39.990 --> 00:24:42.990 the raised clinical work satisfaction

394 00:24:42.990 --> 00:24:43.860 and we can see

395 00:24:43.860 --> 00:24:48.860 that it's yields very high consistency and modus coverage.

396 00:24:50.430 --> 00:24:55.430 And then we test the bundles of these system features,

397 00:24:56.220 --> 00:24:59.490 like team dynamics and provider perceptions

398 00:24:59.490 --> 00:25:01.526 of safety culture together,

399 00:25:01.526 --> 00:25:05.370 you can see it yield very high consistency

400 00:25:05.370 --> 00:25:07.980 and also high coverage

401 00:25:07.980 --> 00:25:12.150 and also the provider perceptions of safety culture

402 00:25:12.150 --> 00:25:14.520 and peer coordination among providers,

403 00:25:14.520 --> 00:25:17.820 you can see the consistency remains very high

404 00:25:17.820 --> 00:25:19.390 but the coverage drops

405 00:25:21.150 --> 00:25:24.030 and also we test all of them together

406 00:25:24.030 --> 00:25:28.410 like the set relations of the three system features

407 00:25:28.410 --> 00:25:29.850 based the outcome.

408 00:25:29.850 --> 00:25:33.683 And you can also see that the consistency remains high,

409 00:25:33.683 --> 00:25:38.613 but the coverage is relatively low, it's only 0.32.

410 00:25:41.160 --> 00:25:46.160 And so, we are expanding the analysis

411 00:25:46.500 --> 00:25:50.250 to include our enabling functions

412 00:25:50.250 --> 00:25:52.560 of the primary care practices

413 00:25:52.560 --> 00:25:56.760 and in our argument, in our final results

414 00:25:56.760 --> 00:26:01.580 and we identify there are three key components

415 00:26:01.580 --> 00:26:05.733 of the operational care process functions.

416 00:26:06.584 --> 00:26:11.310 One is the number three, abnormal test result management

417 00:26:11.310 --> 00:26:13.140 and the number five,

418 00:26:13.140 --> 00:26:15.840 cancel screening for high risk patients.

419 00:26:15.840 --> 00:26:18.540 And number eight is the care transitions

420 00:26:18.540 --> 00:26:21.930 across the primary care practice

421 00:26:21.930 --> 00:26:25.890 and emergency departments or hospitals

422 00:26:25.890 --> 00:26:29.550 and plus this HIT functions,

423 00:26:29.550 --> 00:26:34.360 that they together are the core factors

424 00:26:35.970 --> 00:26:40.796 consisting of the solutions which would yield to the outcome

425 00:26:40.796 --> 00:26:45.796 of our interest, like the strong team dynamics

426 00:26:47.040 --> 00:26:51.720 and also greater level provider perceptions

427 00:26:51.720 --> 00:26:53.103 of safety culture.

428 00:26:58.140 --> 00:27:03.140 So to interpret what we have found in the QCA analysis.

429 00:27:07.710 --> 00:27:10.290 So, "Favorable team dynamics

430 00:27:10.290 --> 00:27:13.866 combined with a strong safety culture contribute most

431 00:27:13.866 --> 00:27:17.670 to the greater clinical work satisfaction."

432 00:27:17.670 --> 00:27:20.520 And, "Provider-perceived safety culture

433 00:27:20.520 --> 00:27:23.310 acts as a core sufficient condition

434 00:27:23.310 --> 00:27:25.890 that presents in both recipes,

435 00:27:25.890 --> 00:27:30.150 yielding for PCP's great clinical work satisfaction."

436 00:27:30.150 --> 00:27:33.515 And, "For the most empirical appliances,"

437 00:27:33.515 --> 00:27:37.867 that means from our empirical cases,

438 00:27:37.867 --> 00:27:42.867 "A strong safety culture is not sufficient on its own

439 00:27:43.590 --> 00:27:48.590 and practice also needs to to create and also implement

440 00:27:51.780 --> 00:27:53.850 the highly functioning teams."

441 00:27:53.850 --> 00:27:58.850 Like to encourage them to foster the strong team dynamics,

442 00:28:00.240 --> 00:28:03.540 visiting the primary care practices.

443 00:28:03.540 --> 00:28:08.540 And also our findings indicate the, "HIT functionality alone

444 00:28:10.440 --> 00:28:14.790 is not sufficient to achieve the desired outcomes."

445 00:28:14.790 --> 00:28:16.380 This is occurring a lot

446 00:28:16.380 --> 00:28:19.650 with what we know from the literature,

447 00:28:19.650 --> 00:28:22.980 because a lot of literature found

448 00:28:22.980 --> 00:28:27.150 that HIT generates a few benefits,

449 00:28:27.150 --> 00:28:32.150 but also to overly emphasize on the utility of HIT

450 00:28:33.510 --> 00:28:37.230 may bring a few adverse effects,

451 00:28:37.230 --> 00:28:42.230 like to increase the volume of the workloads to providers

452 00:28:44.337 --> 00:28:48.120 and contribute to their burnout issues.

453 00:28:48.120 --> 00:28:52.440 So from our analysis, QCA analysis,

454 00:28:52.440 --> 00:28:55.650 it identifies that the HIT functionality

455 00:28:55.650 --> 00:28:59.730 is a core component, but alone, it's not sufficient

456 00:28:59.730 --> 00:29:02.070 to help our providers

457 00:29:02.070 --> 00:29:04.950 to improve their clinical satisfaction.

458 00:29:04.950 --> 00:29:05.970 And also look

459 00:29:05.970 --> 00:29:09.330 at the operational care process functionalities

460 00:29:09.330 --> 00:29:14.330 and we found that the common features of the three factors

461 00:29:15.769 --> 00:29:17.550 which we identify,

462 00:29:17.550 --> 00:29:22.550 they represent it's importance to enable the functions,

463 00:29:24.027 --> 00:29:28.667 identify urgent or complex acute illness

464 00:29:28.667 --> 00:29:32.340 and also request the collaborations

465 00:29:32.340 --> 00:29:34.770 across institutional settings.

466 00:29:34.770 --> 00:29:38.297 And this served as the key factors

467 00:29:38.297 --> 00:29:42.060 within the operational care process functionalities

468 00:29:42.060 --> 00:29:44.640 that can enable our providers

469 00:29:44.640 --> 00:29:47.430 to achieve better team dynamics

470 00:29:47.430 --> 00:29:51.213 and also their perception of safety culture.

471 00:29:54.480 --> 00:29:58.277 And now I want to discuss

472 00:29:59.730 --> 00:30:02.880 a little bit more about the practice implications

473 00:30:02.880 --> 00:30:05.610 of using the QCA in our study.

474 00:30:05.610 --> 00:30:10.610 I see the most attractive part of using QCA

475 00:30:11.543 --> 00:30:15.090 is that it helps to generate the message

476 00:30:15.090 --> 00:30:19.637 that can be very useful and practical for our managers

477 00:30:21.630 --> 00:30:26.580 or the practitioners, in-house systems, for them to use

478 00:30:26.580 --> 00:30:29.170 because usually they are more interested

479 00:30:30.971 --> 00:30:33.810 what are the solution pathways

480 00:30:33.810 --> 00:30:37.290 that we can implement in our systems,

481 00:30:37.290 --> 00:30:40.980 rather than increase on the net effects

482 00:30:40.980 --> 00:30:45.690 of each individual factors, effect on the outcome.

483 00:30:45.690 --> 00:30:50.690 So using QCA, it presents the multiple solution pathways

484 00:30:55.470 --> 00:30:58.500 for our practitioners,

485 00:30:58.500 --> 00:31:02.520 what are the most key factors you can focus

486 00:31:02.520 --> 00:31:07.520 and, or prioritize, in order to achieve the outcome

487 00:31:10.219 --> 00:31:14.610 of your implementation outcome or outcome interest.

488 00:31:14.610 --> 00:31:16.879 So in our study,

489 00:31:16.879 --> 00:31:21.660 because the real obstacles in primary care practices

490 00:31:21.660 --> 00:31:25.050 is usually not possible to enable

491 00:31:25.050 --> 00:31:30.050 or to invest the resource to improve all the conditions

492 00:31:30.180 --> 00:31:35.180 or all the factors in our primary care delivery system.

493 00:31:35.190 --> 00:31:38.525 And so to identify the bundles

494 00:31:38.525 --> 00:31:43.110 can be the prioritized targets for our managers

495 00:31:43.110 --> 00:31:47.910 to emphasize if they want to improve

496 00:31:47.910 --> 00:31:50.550 their provider's work satisfaction.

497 00:31:50.550 --> 00:31:55.080 And our study also highlights the human-centric nature

498 00:31:55.080 --> 00:31:58.470 of the physician clinical work satisfaction,

499 00:31:58.470 --> 00:32:03.450 like how HIT is important as a core components,

500 00:32:03.450 --> 00:32:06.990 but it has to work, function,

501 00:32:06.990 --> 00:32:11.370 with the other key factors together

502 00:32:11.370 --> 00:32:15.873 and it informs the need for non-regulatory strategies.

503 00:32:16.920 --> 00:32:20.700 And we also acknowledge there are a few limitations.

504 00:32:20.700 --> 00:32:24.510 So by using QCA, we're not able to generate

505 00:32:24.510 --> 00:32:26.250 the causal claims.

506 00:32:26.250 --> 00:32:29.790 And also in QCA, one approach,

507 00:32:29.790 --> 00:32:31.230 like to calibrate the data

508 00:32:31.230 --> 00:32:36.230 actually is to refer to the existing empirical evidence,

509 00:32:37.590 --> 00:32:42.300 but because the QCA is relatively new for public health,

510 00:32:42.300 --> 00:32:47.130 evaluative science or health services research,

511 00:32:47.130 --> 00:32:52.130 so external standards or empirical evidence that published

512 00:32:52.740 --> 00:32:57.740 for data calibration are not yet available or established.

513 00:33:01.680 --> 00:33:05.510 And also QCA method may be prone to the type one errors.

514 00:33:06.540 --> 00:33:10.260 And I want to stop at here

515 00:33:10.260 --> 00:33:13.200 and also welcome for a few questions

516 00:33:13.200 --> 00:33:15.791 and if you have data sets

517 00:33:15.791 --> 00:33:20.791 that you think may consider QCA as an approach

518 00:33:22.350 --> 00:33:26.493 to analyze your data to answer the research question,

519 00:33:27.885 --> 00:33:32.377 what QCA can help to work best.

520 00:33:34.140 --> 00:33:39.140 And so welcome to Rachel and I'm very passionate

521 00:33:40.560 --> 00:33:44.730 on exploring computer exploration of this method

522 00:33:44.730 --> 00:33:48.435 in implementation science studies.

523 00:33:48.435 --> 00:33:50.253 Thank you very much.

524 00:34:00.600 --> 00:34:01.863 Any questions?

525 00:34:05.190 --> 00:34:07.623 <v Donna>Yeah, hi Lingrui, this is Donna.</v>

526 00:34:07.623 --> 00:34:08.490 <v Dr. Liu>Hi Donna.</v>

527 00:34:08.490 --> 00:34:10.860 <v Donna>Hi, thank you for the excellent and clear talk.</v>

528 00:34:10.860 --> 00:34:12.570 I really appreciate it.

529 00:34:12.570 --> 00:34:14.220 I have a couple of questions.

530 00:34:14.220 --> 00:34:17.100 So this one is sort of a point of information.

531 00:34:17.100 --> 00:34:19.080 I came in a little late unfortunately

532 00:34:19.080 --> 00:34:21.660 and I didn't catch those two measures.

533 00:34:21.660 --> 00:34:23.430 What is consistency?

534 00:34:23.430 --> 00:34:24.600 And there was something else,

535 00:34:24.600 --> 00:34:26.850 another measure that was appearing

536 00:34:26.850 --> 00:34:28.619 on a number of your slides?

537 00:34:28.619 --> 00:34:31.590 <v Dr. Liu>Yeah, so one is consistency</v>

538 00:34:31.590 --> 00:34:32.970 and one is coverage.

539 00:34:32.970 --> 00:34:36.390 So consistency indicates the strength,

540 00:34:36.390 --> 00:34:41.390 you can consider as the p value,

541 00:34:42.060 --> 00:34:47.060 it's very like the p value in regressions

542 00:34:47.130 --> 00:34:50.553 and it indicates the strengths of the association-

543 00:34:51.549 --> 00:34:54.630 <v Donna>I'm sorry, the strength of the association</v>

544 00:34:54.630 --> 00:34:56.070 of what with what?

545 00:34:56.070 --> 00:34:58.230 <v Dr. Liu>Of explanatory.</v>

546 00:34:58.230 --> 00:35:03.230 I'm trying to not use the terminology from our regression

547 00:35:05.610 --> 00:35:09.090 or statistics to explain the QCA,

548 00:35:09.090 --> 00:35:13.770 because they are definitely two different methods.

549 00:35:13.770 --> 00:35:18.770 But because of my experience of presenting this method,

550 00:35:18.840 --> 00:35:21.082 I know that usually it's helpful

551 00:35:21.082 --> 00:35:24.270 to borrow some terminology

552 00:35:24.270 --> 00:35:28.470 from the conventional statistic analysis

553 00:35:28.470 --> 00:35:31.443 to interpret the terminology in QCA.

554 00:35:32.580 --> 00:35:36.423 And so back to your question,

555 00:35:38.910 --> 00:35:43.910 so consistency indicates the strength of the relationship

556 00:35:43.980 --> 00:35:48.690 between the explanatory variables and the outcome.

557 00:35:48.690 --> 00:35:50.010 So actually in QCA,

558 00:35:50.010 --> 00:35:52.950 because it's based in Boolean logic,

559 00:35:52.950 --> 00:35:56.910 it's actually not, variables is the conditions.

560 00:35:56.910 --> 00:35:58.710 So it's identifying

561 00:35:58.710 --> 00:36:02.550 what are the necessary and sufficient conditions

562 00:36:02.550 --> 00:36:07.500 that would lead to the occurrence of the outcome.

563 00:36:07.500 --> 00:36:12.500 And the other measure is the coverage,

564 00:36:14.720 --> 00:36:17.910 it also ranges from zero to one.

565 00:36:17.910 --> 00:36:22.910 It tells the proportion of, for example, in my studies,

566 00:36:23.190 --> 00:36:26.130 the proportion of the practice sites

567 00:36:26.130 --> 00:36:29.790 which have the specific bundle,

568 00:36:29.790 --> 00:36:32.973 so it tells the empirical appliance.

569 00:36:33.870 --> 00:36:38.870 Because in QCA, you first identify given your conditions

570 00:36:38.910 --> 00:36:43.910 and also the case data, you could identify

571 00:36:44.190 --> 00:36:48.030 what are all the logically possible solutions,

572 00:36:48.030 --> 00:36:53.010 but logically possible solutions are not all applied

573 00:36:53.010 --> 00:36:55.710 in your empirical cases.

574 00:36:55.710 --> 00:37:00.710 So coverage tells within your empirical cases,

575 00:37:01.440 --> 00:37:06.440 what the proportion of your cases have a specific bundle

576 00:37:08.010 --> 00:37:12.603 or a specific solution, I hope it helps!

577 00:37:14.130 --> 00:37:17.040 <v Donna>Sort of, well I had a couple of other questions,</v>

578 00:37:17.040 --> 00:37:20.033 but let's see if other people have questions first.

579 00:37:32.280 --> 00:37:33.900 <v Luke>Thanks for the great talk.</v>

580 00:37:33.900 --> 00:37:35.970 I have a question about the early part

581 00:37:35.970 --> 00:37:37.530 of the thematic analysis part.

582 00:37:37.530 --> 00:37:40.080 Is that different in qualitative comparative analysis

583 00:37:40.080 --> 00:37:40.913 than it would be,

584 00:37:40.913 --> 00:37:42.630 maybe with other more traditional techniques

585 00:37:42.630 --> 00:37:45.240 or does it sort of operate similarly?

586 00:37:45.240 --> 00:37:49.268 Obviously you're applying these codes

587 00:37:49.268 --> 00:37:51.843 to what you're learning from the sites.

588 00:37:54.900 --> 00:37:58.853 <v Dr. Liu>Sorry, I missed the first part of your question.</v>

589 00:38:00.823 --> 00:38:02.070 <v Luke>I'm asking a little bit</v>

590 00:38:02.070 --> 00:38:04.717 about how you code these themes

591 00:38:04.717 --> 00:38:07.860 from the data that you're getting from the participants,

592 00:38:07.860 --> 00:38:09.150 is that different than you do

593 00:38:09.150 --> 00:38:12.360 in traditional qualitative, say, thematic analysis

594 00:38:12.360 --> 00:38:16.023 or does it operate according to similar rules?

595 00:38:17.340 --> 00:38:19.680 <v Dr. Liu>This is a great question.</v>

596 00:38:19.680 --> 00:38:24.030 Yeah, actually this touches up on the key part

597 00:38:24.030 --> 00:38:27.513 of the QCA analysis.

598 00:38:29.991 --> 00:38:32.760 Given my experience working with this method,

599 00:38:32.760 --> 00:38:37.760 I consider, it's kind of a build up

600 00:38:37.800 --> 00:38:42.800 on the conventional qualitative or quantitative analysis,

601 00:38:43.560 --> 00:38:48.390 that you have a few cases

602 00:38:48.390 --> 00:38:53.390 and then you will apply the conventional qualitative coding

603 00:38:54.360 --> 00:38:58.920 to your data, for example you have interview data

604 00:38:58.920 --> 00:39:03.421 and also then the additional steps,

605 00:39:03.421 --> 00:39:08.421 you need to calibrate your data to re-skill your data

606 00:39:10.620 --> 00:39:14.163 into membership range,

607 00:39:15.450 --> 00:39:19.320 just the two in very simple words is from zero to one,

608 00:39:19.320 --> 00:39:23.580 like rescale your data into zero to one.

609 00:39:23.580 --> 00:39:27.261 And there are two approaches in QCA,

610 00:39:27.261 --> 00:39:32.261 one is crisp QCA and one's fuzzy sets QCA.

611 00:39:32.880 --> 00:39:37.880 So basically you set up, you need to discuss this,

612 00:39:38.400 --> 00:39:39.960 the empirical experts

613 00:39:39.960 --> 00:39:44.880 and also who has the knowledge about the cases

614 00:39:44.880 --> 00:39:48.790 to decide what are the thresholds to be used

615 00:39:50.441 --> 00:39:53.250 to rescale your data sets,

616 00:39:53.250 --> 00:39:58.250 like the codes used to calibrate your data sets

617 00:39:58.620 --> 00:40:02.520 into the range of zero to one.

618 00:40:02.520 --> 00:40:07.520 So for example, you have to define

619 00:40:07.620 --> 00:40:12.620 what are the three thresholds you need to use,

620 00:40:13.980 --> 00:40:18.980 to calibrate the outcome of grades level satisfaction

621 00:40:21.480 --> 00:40:23.820 among primary care providers.

622 00:40:23.820 --> 00:40:25.143 So these surveys,

623 00:40:26.910 --> 00:40:30.570 the original survey uses zero to five scores,

624 00:40:30.570 --> 00:40:34.423 but in QCA there are a few decision rules

625 00:40:39.420 --> 00:40:44.420 like consider the statistical characteristic of your data

626 00:40:44.430 --> 00:40:49.430 and also refer to the existing empirical evidence

627 00:40:50.910 --> 00:40:53.845 and also your knowledge,

628 00:40:53.845 --> 00:40:58.567 the researcher's knowledge about your data, your cases.

629 00:40:58.567 --> 00:41:03.060 And together you decide what are the decision rules

630 00:41:03.060 --> 00:41:08.060 to set up the thresholds to rescale the data sets,

631 00:41:09.780 --> 00:41:14.130 rescale the data on the outcome variable

632 00:41:14.130 --> 00:41:16.050 into the zero to one.

633 00:41:16.050 --> 00:41:18.120 So for each of your variable

634 00:41:18.120 --> 00:41:21.737 you have the same principles of decision rules,

635 00:41:27.901 --> 00:41:32.901 which would lead to yields into different thresholds,

636 00:41:34.050 --> 00:41:38.643 for each of variables to be rescaled into that range,

637 00:41:38.643 --> 00:41:41.643 like zero to one range.

638 00:41:44.580 --> 00:41:45.670 Is that helpful?

639 00:41:46.770 --> 00:41:47.880 <v Mona>I had a question,</v>

640 00:41:47.880 --> 00:41:49.680 somewhat related to what Luke asked

641 00:41:49.680 --> 00:41:52.560 and maybe my question will also kind of get into more depth

642 00:41:52.560 --> 00:41:53.393 around this issue.

643 00:41:53.393 --> 00:41:55.050 So it sounded like what you were just describing

644 00:41:55.050 --> 00:41:57.810 was the process of defining your outcome

645 00:41:57.810 --> 00:42:00.960 of sort of clinician satisfaction

646 00:42:00.960 --> 00:42:03.430 and defining how you're gonna take something

647 00:42:04.417 --> 00:42:06.840 that's more continuous score or continuous measure

648 00:42:06.840 --> 00:42:09.030 into a binary outcome

649 00:42:09.030 --> 00:42:11.100 where you could do something like QCA,

650 00:42:11.100 --> 00:42:14.730 on the other side of the predictors or the factors

651 00:42:14.730 --> 00:42:17.550 that you are associating with satisfaction,

652 00:42:17.550 --> 00:42:21.150 it sounds like in this study you were using a survey,

653 00:42:21.150 --> 00:42:23.220 potentially with some validated measures

654 00:42:23.220 --> 00:42:24.840 of certain factors.

655 00:42:24.840 --> 00:42:26.460 Related to Luke's question,

656 00:42:26.460 --> 00:42:28.830 I feel like I've seen some presentations of QCA

657 00:42:28.830 --> 00:42:32.550 where they've used qualitative interviews or focus groups

658 00:42:32.550 --> 00:42:34.083 and they've sort of coded,

659 00:42:36.270 --> 00:42:38.130 using standard qualitative methods,

660 00:42:38.130 --> 00:42:41.927 coded the outcomes or the factors

661 00:42:43.230 --> 00:42:45.630 and then kind of used that group consensus

662 00:42:45.630 --> 00:42:49.260 to sort of translate that coding into quantitative,

663 00:42:49.260 --> 00:42:51.090 I wondered if you could talk to us more about that,

664 00:42:51.090 --> 00:42:52.620 'cause I feel like QCA

665 00:42:52.620 --> 00:42:56.070 to me has a lot of potential in mixed methods approaches

666 00:42:56.070 --> 00:43:01.070 as a way to formalize that hypothesis generation process

667 00:43:01.230 --> 00:43:04.050 that you so nicely kind of displayed here.

668 00:43:04.050 --> 00:43:05.730 So I'd love to have you talk a little bit more

669 00:43:05.730 --> 00:43:09.480 about the different applications of QCA in surveys

670 00:43:09.480 --> 00:43:12.270 versus more pure qualitative interviews

671 00:43:12.270 --> 00:43:14.430 and open-ended responses.

672 00:43:14.430 --> 00:43:17.160 <v Dr. Liu>Yeah, and this is a great question.</v>

673 00:43:17.160 --> 00:43:20.910 So from my understanding of this matter,

674 00:43:20.910 --> 00:43:23.880 I consider this is a mixed matter

675 00:43:23.880 --> 00:43:28.880 and yeah it is true that it can be case oriented QCA

676 00:43:31.500 --> 00:43:34.050 or variable oriented QCA,

677 00:43:34.050 --> 00:43:38.610 but I understand in a way, that's the nature of the case

678 00:43:38.610 --> 00:43:40.323 or variable is the same thing.

679 00:43:45.008 --> 00:43:49.758 I mean, ideally you can design the data collection after,

680 00:43:51.121 --> 00:43:53.788 as I show like in the reference,

681 00:43:56.580 --> 00:43:58.740 like the research starts phase,

682 00:43:58.740 --> 00:44:00.450 you have the research problem,

683 00:44:00.450 --> 00:44:05.450 you have approximate research question you want to explore

684 00:44:06.120 --> 00:44:08.970 and you refer to the existing theory

685 00:44:08.970 --> 00:44:12.930 to guide you post the hypothesis

686 00:44:12.930 --> 00:44:17.101 and to guide your data collection,

687 00:44:17.101 --> 00:44:20.430 to help with your data design.

688 00:44:20.430 --> 00:44:24.993 And you apply the QCA to analyze these data sets.

689 00:44:26.190 --> 00:44:30.480 But in practice, like for example in our study,

690 00:44:30.480 --> 00:44:35.173 and we first have the service completed in the whole program

691 00:44:39.300 --> 00:44:43.940 and then we figure out our research question,

692 00:44:43.940 --> 00:44:47.190 it's more interesting at the system level,

693 00:44:47.190 --> 00:44:49.950 at the primary care practice level.

694 00:44:49.950 --> 00:44:52.890 And we were very curious

695 00:44:52.890 --> 00:44:57.890 to explore how QCA can help us to answer this question.

696 00:44:58.620 --> 00:45:03.620 So we have our data already completed

697 00:45:04.560 --> 00:45:07.470 and the compliments with the interviews,

698 00:45:07.470 --> 00:45:11.130 like the small size interview,

699 00:45:11.130 --> 00:45:14.700 the qualitative interview for the manager

700 00:45:14.700 --> 00:45:17.670 of each primary care practices,

701 00:45:17.670 --> 00:45:21.600 but ideally, if you can apply the QCA,

702 00:45:26.130 --> 00:45:27.840 consider to use this method

703 00:45:27.840 --> 00:45:30.600 at the stage of asking your research question

704 00:45:30.600 --> 00:45:35.600 and write your proposal and to combine the implements,

705 00:45:41.821 --> 00:45:46.821 the way how to design your data collection,

706 00:45:48.270 --> 00:45:51.600 either the service or qualitative interviews

707 00:45:51.600 --> 00:45:53.043 in your data collection,

708 00:45:54.934 --> 00:45:57.840 in the way that the QCA would need,

709 00:45:57.840 --> 00:46:02.840 like the qualitative data or quantitative data.

710 00:46:03.929 --> 00:46:08.929 So that's one limitation of our study

711 00:46:09.363 --> 00:46:14.363 that we were not able to confirm that we want to use the QCA

712 00:46:17.280 --> 00:46:21.450 and then we use the QCA framework

713 00:46:21.450 --> 00:46:23.400 to guide our data collection.

714 00:46:23.400 --> 00:46:26.760 And so now I have a project

715 00:46:26.760 --> 00:46:30.940 that I work with my here and Donna

716 00:46:31.845 --> 00:46:33.690 and also our colleagues in China

717 00:46:33.690 --> 00:46:38.460 that we now already proposed the research questions

718 00:46:38.460 --> 00:46:43.380 as the hospital level or like the organizational level

719 00:46:43.380 --> 00:46:47.160 and we will use the QCA frameworks

720 00:46:47.160 --> 00:46:50.220 to help guide our data collection.

721 00:46:50.220 --> 00:46:55.220 So that will solve a few issues that may come out

722 00:46:56.220 --> 00:46:59.010 as the limitations of the study.

723 00:46:59.010 --> 00:47:03.150 And also another thought related to your question

724 00:47:03.150 --> 00:47:07.320 about using qualitative and quantitative data

725 00:47:07.320 --> 00:47:09.153 in the QCA analysis,

726 00:47:12.004 --> 00:47:16.683 so in my study, the majority of my data is the survey data.

727 00:47:18.030 --> 00:47:20.850 But from my study of this method,

728 00:47:20.850 --> 00:47:25.850 is that for working with QCA in the qualitative data

729 00:47:28.140 --> 00:47:33.140 is that after using the traditional qualitative coding

730 00:47:34.320 --> 00:47:38.580 you will needs to take additional steps,

731 00:47:38.580 --> 00:47:43.580 to calibrate the data into scale of zero to one

732 00:47:44.370 --> 00:47:49.370 to indicate the extent to which of your variable,

733 00:47:50.640 --> 00:47:53.463 from the lower membership to higher membership,

734 00:47:56.319 --> 00:47:58.350 you can understand the way the lower performance

735 00:47:58.350 --> 00:48:00.990 of this variable to the higher performance

736 00:48:00.990 --> 00:48:04.383 of this variable in this study.

737 00:48:06.540 --> 00:48:09.483 Yeah, did I answer your question?

738 00:48:11.333 --> 00:48:12.210 <v Mona>I think so.</v>

739 00:48:12.210 --> 00:48:16.653 Somehow getting group consensus, in terms of quantifying,

740 00:48:18.600 --> 00:48:21.180 almost like labeling of a variable.

741 00:48:21.180 --> 00:48:23.520 So for example, I'm really thinking about

742 00:48:23.520 --> 00:48:26.520 how much this might be of relevance to Leslie,

743 00:48:26.520 --> 00:48:29.010 the work you've done in positive deviant studies,

744 00:48:29.010 --> 00:48:33.060 sort of identifying sites or organizations

745 00:48:33.060 --> 00:48:34.110 that are really excelling,

746 00:48:34.110 --> 00:48:35.785 or individuals that are really excelling

747 00:48:35.785 --> 00:48:37.770 and the sites that maybe are not.

748 00:48:37.770 --> 00:48:41.460 And then using QCA to sort of label

749 00:48:41.460 --> 00:48:44.340 some of the factors that might be potential drivers.

750 00:48:44.340 --> 00:48:46.140 And I think Ling what I'm hearing you say

751 00:48:46.140 --> 00:48:50.010 is that you would have to assign some numerical scale

752 00:48:50.010 --> 00:48:54.900 to those factors, in terms of their presence or absence

753 00:48:54.900 --> 00:48:58.825 and then maybe ranges along that scale.

754 00:48:58.825 --> 00:48:59.658 <v Dr. Liu>Yeah, yeah.</v>

755 00:49:00.750 --> 00:49:03.330 <v Donna>Yeah, I am still mystified by this</v>

756 00:49:03.330 --> 00:49:04.770 and I've heard Ling talk about it,

757 00:49:04.770 --> 00:49:06.180 maybe a half a dozen times.

758 00:49:06.180 --> 00:49:09.720 I really wanna learn and understand, I really do

759 00:49:09.720 --> 00:49:12.180 and, you know, each time I get a little closer,

760 00:49:12.180 --> 00:49:13.410 but in this instance,

761 00:49:13.410 --> 00:49:16.770 the calibration to me feels really daunting.

762 00:49:16.770 --> 00:49:19.800 Like as the analog and a qualitative data set,

763 00:49:19.800 --> 00:49:21.240 if we imagine, those of us,

764 00:49:21.240 --> 00:49:24.360 there's a bunch on the panel here who do qualitative work.

765 00:49:24.360 --> 00:49:27.540 You know, if you're in a large group of coders,

766 00:49:27.540 --> 00:49:31.440 getting consensus on a construct can be really hard.

767 00:49:31.440 --> 00:49:34.080 Just even what is this thing?

768 00:49:34.080 --> 00:49:38.280 And so then to have to parse that even further

769 00:49:38.280 --> 00:49:41.073 to say like, yes, no, it exists.

770 00:49:42.060 --> 00:49:45.540 If you're imagining, I don't know, some intangible quality,

771 00:49:45.540 --> 00:49:47.700 if in our work, if we're looking at organizations

772 00:49:47.700 --> 00:49:51.600 and the way they behave and dimension of culture.

773 00:49:51.600 --> 00:49:56.430 So I think how this might work in these small case studies,

774 00:49:56.430 --> 00:49:57.750 these positive deviant studies

775 00:49:57.750 --> 00:49:59.850 where you may have 10 or 12 organizations

776 00:49:59.850 --> 00:50:01.143 or units of analysis,

777 00:50:02.490 --> 00:50:04.290 would be having to move

778 00:50:04.290 --> 00:50:07.080 from not only consensus around coding,

779 00:50:07.080 --> 00:50:08.280 so how do you interpret

780 00:50:08.280 --> 00:50:10.530 a particular piece of qualitative data,

781 00:50:10.530 --> 00:50:15.510 but then this fuzzy piece, like where's the boundary?

782 00:50:15.510 --> 00:50:17.160 Is it a yes or no?

783 00:50:17.160 --> 00:50:20.910 Is it a leadership engagement?

784 00:50:20.910 --> 00:50:22.500 Is it there, yes or no?

785 00:50:22.500 --> 00:50:25.200 So that to me feels daunting.

786 00:50:25.200 --> 00:50:27.330 But if one could accomplish that

787 00:50:27.330 --> 00:50:30.510 in the coding of the narrative textual data,

788 00:50:30.510 --> 00:50:33.450 it seems like there's huge potential to look differently

789 00:50:33.450 --> 00:50:35.250 at combinations of patterns,

790 00:50:35.250 --> 00:50:38.190 which to me, continues to be the takeaway here,

791 00:50:38.190 --> 00:50:39.720 trying to distill

792 00:50:39.720 --> 00:50:42.360 through many, many, many combinations of variables,

793 00:50:42.360 --> 00:50:44.880 if we look at organizational culture measures,

794 00:50:44.880 --> 00:50:46.233 a hundred variables,

795 00:50:47.130 --> 00:50:50.640 how do you find the right combination of the six

796 00:50:50.640 --> 00:50:52.440 that are gonna get you the farthest,

797 00:50:52.440 --> 00:50:54.900 if you're somebody who needs to intervene,

798 00:50:54.900 --> 00:50:57.150 if you're trying to intervene organizationally.

799 00:50:57.150 --> 00:51:00.510 But yeah, I'm on a learning curve, that's for sure.

800 00:51:00.510 --> 00:51:02.460 But I could see Mona, how it might help

801 00:51:02.460 --> 00:51:04.473 in those kinds of designs.

802 00:51:05.310 --> 00:51:06.143 But there's a lot of work

803 00:51:06.143 --> 00:51:09.679 on the qualitative interpretation side, I think.

804 00:51:09.679 --> 00:51:14.679 <v Dr. Liu>Thank you for your insights and comments Mona.</v>

805 00:51:15.090 --> 00:51:17.130 Yeah, at the beginning I said

806 00:51:17.130 --> 00:51:21.150 this is not a educational workshop about the method

807 00:51:21.150 --> 00:51:26.150 and I consider this a forum where we can discuss

808 00:51:26.250 --> 00:51:29.610 and to explore further

809 00:51:29.610 --> 00:51:34.610 as I present, display, methods relatively new

810 00:51:34.620 --> 00:51:39.243 to probably health and evaluative science.

811 00:51:40.242 --> 00:51:42.480 And so I consider this an opportunity,

812 00:51:42.480 --> 00:51:45.690 I can introduce the method to our broader audience

813 00:51:45.690 --> 00:51:47.991 and if you have more data set,

814 00:51:47.991 --> 00:51:51.390 or you have a similar research question

815 00:51:51.390 --> 00:51:53.550 that you think are similar to this

816 00:51:53.550 --> 00:51:57.600 and you may consider to use the QCA

817 00:51:57.600 --> 00:51:58.937 to help with your analysis.

818 00:51:58.937 --> 00:52:02.220 And as you see the years, like they're pretty new,

819 00:52:02.220 --> 00:52:06.840 like recent, three or four years

820 00:52:06.840 --> 00:52:08.490 and also have been most conducted

821 00:52:09.450 --> 00:52:11.910 in high income country settings.

822 00:52:11.910 --> 00:52:15.591 So I see there is a huge room

823 00:52:15.591 --> 00:52:19.230 for implementation science scholars

824 00:52:19.230 --> 00:52:22.863 and practitioners to explore.

825 00:52:24.720 --> 00:52:27.135 And I'm also on the learning curve!

826 00:52:27.135 --> 00:52:28.260 (Dr. Liu Laughing)

827 00:52:28.260 --> 00:52:31.770 And back to one point, lastly mentioned

828 00:52:31.770 --> 00:52:34.920 about how to select the case

829 00:52:34.920 --> 00:52:36.690 and also select the variables,

830 00:52:36.690 --> 00:52:40.170 from my experience and the study of the method

831 00:52:40.170 --> 00:52:44.430 is like, now I think it's important

832 00:52:44.430 --> 00:52:49.430 you have the hypothesis from existing theory,

833 00:52:50.610 --> 00:52:51.870 to guide you.

834 00:52:51.870 --> 00:52:56.040 So it's not possible to include all the factors

835 00:52:56.040 --> 00:52:59.403 of relevance in your analysis,

836 00:53:05.041 --> 00:53:08.323 like one key step is you use the calibrated data

837 00:53:09.630 --> 00:53:14.630 to construct the Truth Table, the two two case power table.

838 00:53:15.180 --> 00:53:18.780 So for example, you have three conditions

839 00:53:18.780 --> 00:53:20.580 or three explanatory variables,

840 00:53:20.580 --> 00:53:23.040 you will have eight rows.

841 00:53:23.040 --> 00:53:24.330 Think about this way,

842 00:53:24.330 --> 00:53:26.520 you have eight explanatory variables,

843 00:53:26.520 --> 00:53:30.570 you will have over 200 rows,

844 00:53:30.570 --> 00:53:35.570 it's eight multiplied by eight.

845 00:53:38.400 --> 00:53:43.400 So you have to limit, what are the key variables

846 00:53:44.797 --> 00:53:49.797 extracting from existing empirical knowledge

847 00:53:50.100 --> 00:53:53.520 or the theory to guide you,

848 00:53:53.520 --> 00:53:56.379 select the case and also variables.

849 00:53:56.379 --> 00:54:01.379 And I think it's important to also keep in mind the outcome.

850 00:54:07.590 --> 00:54:11.370 I think yeah, definition of your variables

851 00:54:11.370 --> 00:54:16.370 and also calibrating your data are very important,

852 00:54:16.740 --> 00:54:21.740 because I consider it's a way to help you to summarize

853 00:54:22.500 --> 00:54:27.500 or describe the patterns of the relations

854 00:54:27.693 --> 00:54:30.570 between your condition variables

855 00:54:30.570 --> 00:54:33.957 and your outcome variable, yeah.

856 00:54:33.957 --> 00:54:35.280 (Dr. Liu Laughing)

857 00:54:35.280 --> 00:54:36.330 <v Donna>So Ling let me ask</v>

858 00:54:36.330 --> 00:54:37.920 what might be the last question

859 00:54:37.920 --> 00:54:40.410 or it shouldn't even be asked,

860 00:54:40.410 --> 00:54:42.390 'cause people probably have to wrap up and go.

861 00:54:42.390 --> 00:54:45.930 But to me, like the two to the K table

862 00:54:45.930 --> 00:54:47.880 that's I don't wanna say just,

863 00:54:47.880 --> 00:54:51.150 but that seems to be very similar if not identical

864 00:54:51.150 --> 00:54:54.570 to what happens in a full factorial design.

865 00:54:54.570 --> 00:54:57.720 And then once you have the factorial design

866 00:54:57.720 --> 00:54:59.910 and you have all the factors,

867 00:54:59.910 --> 00:55:03.180 there are different approaches to kind of using regression

868 00:55:03.180 --> 00:55:05.970 and variable selection, even machine learning

869 00:55:05.970 --> 00:55:09.690 to try to pick what main effects there might be

870 00:55:09.690 --> 00:55:14.165 and combinations and whole packages and so forth.

871 00:55:14.165 --> 00:55:18.360 That might be the most effective with respect to an outcome.

872 00:55:18.360 --> 00:55:20.550 So I'm not sure how this is different from that,

873 00:55:20.550 --> 00:55:22.680 once you get to the quantitative side,

874 00:55:22.680 --> 00:55:24.630 there probably isn't time to say

875 00:55:24.630 --> 00:55:27.030 and maybe we just need to look more carefully

876 00:55:27.030 --> 00:55:28.710 and maybe it is very similar

877 00:55:28.710 --> 00:55:31.180 and people get to similar spots

878 00:55:34.290 --> 00:55:36.213 from different starting points.

879 00:55:37.294 --> 00:55:39.780 But I'm wondering if this analysis is done

880 00:55:39.780 --> 00:55:42.510 after an intervention is conducted

881 00:55:42.510 --> 00:55:45.000 or is this observational research

882 00:55:45.000 --> 00:55:47.640 to try to develop the intervention

883 00:55:47.640 --> 00:55:51.090 and figure out which two to the K combinations

884 00:55:51.090 --> 00:55:55.320 are the best ones to test now in a randomized trial?

885 00:55:55.320 --> 00:55:56.970 'Cause all of this is also very close

886 00:55:56.970 --> 00:55:59.943 to the MOST design of Linda Collins.

887 00:56:01.350 --> 00:56:03.540 But I don't know, maybe it's just some comments

888 00:56:03.540 --> 00:56:04.800 or food for thought

889 00:56:04.800 --> 00:56:06.990 and we probably should let people go

890 00:56:06.990 --> 00:56:10.020 and maybe Ling, we can talk about it some other time?

891 00:56:10.020 --> 00:56:13.560 <v Dr. Liu>Yeah, and I just agree with your comment.</v>

892 00:56:13.560 --> 00:56:17.040 I'd say now the QCA scholarship,

893 00:56:17.040 --> 00:56:20.340 they are discussing about applying this method

894 00:56:20.340 --> 00:56:23.400 to longitudinal, like large sample sets

895 00:56:23.400 --> 00:56:26.850 and also combine with the techniques

896 00:56:29.910 --> 00:56:32.220 from the conventional statistics,

897 00:56:32.220 --> 00:56:34.800 like the machine learning, like that's what you mentioned.

898 00:56:34.800 --> 00:56:37.650 But that is like too new.

899 00:56:37.650 --> 00:56:40.370 I think that probably, at this point,

900 00:56:44.280 --> 00:56:46.560 probably we want to start from the beginning

901 00:56:46.560 --> 00:56:48.300 to understand this method

902 00:56:48.300 --> 00:56:51.029 and also encourage some exploration

903 00:56:51.029 --> 00:56:54.350 of the utility of this matter

904 00:56:54.350 --> 00:56:57.510 in our implementation science projects.

905 00:56:57.510 --> 00:57:02.310 But yeah, a lot of insights

906 00:57:02.310 --> 00:57:05.340 and comments are very helpful today

907 00:57:05.340 --> 00:57:08.733 from our audience, yeah, thank you.

908 00:57:11.280 --> 00:57:13.984 I'm reading the message on charts.

909 00:57:13.984 --> 00:57:16.050 (Dr. Liu Laughing)

910 00:57:16.050 --> 00:57:20.430 <v Donna>Well, I don't know if mayor, maybe he has left,</v>

911 00:57:20.430 --> 00:57:22.980 but I can as sort of a-co convener thank Ling

912 00:57:22.980 --> 00:57:25.620 for this very interesting presentation

913 00:57:25.620 --> 00:57:27.840 and thank everybody for participating.

914 00:57:27.840 --> 00:57:30.840 And yeah, we'll look forward to further discussions

915 00:57:30.840 --> 00:57:33.120 about this and looking at the relationship

916 00:57:33.120 --> 00:57:36.570 between these different approaches in implementation science

917 00:57:36.570 --> 00:57:40.170 to building complex multilevel interventions

918 00:57:40.170 --> 00:57:42.810 that are effective and cost effective.

919 00:57:42.810 --> 00:57:45.210 So thanks everyone and bye-bye.

920 00:57:45.210 --> 00:57:46.743 <v Dr. Liu>Thank you, bye!</v>