1 **The monitoring and evaluation of CycleOn – a system approach**

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3 **ABSTRACT (WORD COUNT 294)**

4 **Background**

5 In the Netherlands, a new, innovative program was initiated in order to reduce the number of

6 accidents with elderly cyclists: CycleOn. CycleOn aims to increase awareness amongst elderly

7 cyclists about the risks of cycling, followed by instigating behavioural change. The aim of this

8 study is to evaluate CycleOn using a system approach. Instead of solely focusing on the number

9 of cycling accidents, the main aim is to assess changes in awareness and attitude of elderly

10 cyclists. Additionally, to evaluate the program as a whole, we will examine the reach of the

11 program and the level and quality of the implementation and adoption in four local settings.

12 **Method**

13 The evaluation of CycleOn is performed over the course of two years. A theoretical framework

14 is created using desk research and interviews with experts. The reach of the program and the

15 level of implementation are examined by administering questionnaires. Individual interviews

16 with coordinators and focus group interviews with local CycleOn partners will be conducted in

17 June 2020. Individual interviews with elderly cyclists will be performed in 2021, to assess

18 changes in awareness, attitude and behaviour.

19 **Results**

20 The theoretical analysis of CycleOn, using the integrated change model, demonstrates that all

21 aspects of behavioural change are addressed. The program is being implemented in 85

22 municipalities. Implementation is mostly still in a preparatory phase, but municipalities report

23 high levels of commitment among local CycleOn partners.

24 **Conclusions**

25 CycleOn is an innovative program in increasing cycling safety in elderly. First results demonstrate

26 that this new approach is theoretically well described and that local implementation is still in an

27 early stage. In the summer of 2020, we are assessing which elements of the program are (most)

28 effective and identifying facilitators and barriers in implementation. At ICSC 2020, these results

29 will be presented.

30

31 **Keywords:** CycleOn, cycling, elderly, safety awareness, system approach.

32 1 INTRODUCTION (WORD COUNT 1501)

33   In the Netherlands, the number of elderly cyclists involved in accidents has been increasing since

34   2000 (Weiermars et al, 2018). To lower the number of accidents with elderly cyclists, and to

35   keep them cycling safely for as long as possible, the Ministry of Infrastructure has initiated a

36   new, innovative program, called CycleOn.

37   Based on the theoretical assumption that awareness is a central precursor to behavioural

38   change (De Vries et al., 2003), CycleOn aims to increase awareness of safety concerns among

39   elderly cyclists before aiming on behavioural change. CycleOn therefore focuses on increasing

40   awareness first by making safety concerns and cycling safety open to discussion at places elderly

41   regularly visit and in their own (trusted) network (e.g. in a gym class, at the bridge club, during

42   the visit of a physician, when purchasing a bicycle). Here, the elderly are provided with

43   information about safety concerns and will be able to participate in activities that make them

44   aware of the risks. Then, in order to change the behaviour of the elderly and to eventually

45   improve cycling safety, information and advice about how to cycle safely is provided, along with

46   activities that allow the elderly to experience safe cycling.

47   After a successful pilot study, CycleOn officially started in The Netherlands in 2018. CycleOn is

48   coordinated at a national level, but is implemented locally, in municipalities. The

49   implementation of CycleOn in municipalities may differ as there are numerous activities and

50   means of communication provided by the national organization that municipalities can choose

51   to implement. Every municipality can implement the program in their own way, by using

52   activities and means of communication provided by the national organization, or by creating

53   their own. The program also provides the elderly a digital platform with practical resources,

54   knowledge and support. Elderly can find exercises to improve coordination, muscle strength,

55   neck/shoulder flexibility, responsiveness and endurance and can fill in a selection guide that

56   helps them choose which bicycle is suitable for them.

57   The aim of this study is to evaluate the whole implementation process of CycleOn and assess its

58   outcomes using a system approach, as described by Rutter et al. (2017) and Kremers et al (2018).

59   Following the RE-AIM model, we will assess the reach of the program, its effectiveness, the rate

60   of adoption in local settings, the level and quality of implementation and the extent to which

61   the program becomes institutionalized. We examine the effectiveness of CycleOn by examining

62   changes in awareness and attitude of elderly cyclists using the integrated change model.

63   **2   METHOD**

64   The evaluation of CycleOn is performed over the course of two years. Data is collected using

65   several qualitative and quantitative methods.

66   **2.1 Program theory**

67   First, desk research and interviews with experts in the field of behavioural strategy programs in

68   elderly and cycling safety were performed in order to develop a program theory for CycleOn. A

69   program theory is often formed using practical experiences (best practices) and knowledge from

70   (scientific) research. CycleOn, however, was developed on the basis of behavioural insights

71   (collected from behavioural experts) and in consultation with the target group.

72   Therefore, to form the theoretical base for this study, a program theory was formed first. A total

73   of 8 interviews were conducted with a variety of experts on cycle safety: quartermasters,

74   members of the national CycleOn organization, an implementation designer, an expert in road

75   safety and a researcher in the field of fall prevention for the elderly. In these interviews the

76   researchers addressed subjects such as the motives for the development of CycleOn, the

77   intended strategies and theoretical substantiation of the program and expected results.

4

78 **2.2 Local implementation**

79 The reach of the program and the level of implementation are assessed by administering

80 questionnaires to coordinators within the municipalities involved in the regional and local

81 implementation. Additionally, individual interviews with these coordinators and focus group

82 interviews with local CycleOn partners (such as bicycle retailers, sports clubs, etc.) are

83 performed to further assess which elements are (most) effective and identify barriers and

84 facilitators.

85 **2.3 Elderly cyclists' experiences**

86 In order to explore how CycleOn is experienced by elderly cyclists and to assess changes in their

87 awareness and attitude, approximately 30 individual interviews with participants will be

88 conducted. In these interviews, qualitative and quantitative methods are combined using Q-

89 methodology (Brown, 1993). The elderly are presented statements about their experiences with

90 CycleOn to discuss. These statements will help identify participant typologies, to get a better

91 understanding of the program's target group.

92 **3   RESULTS**

93 **3.1 Program theory**

94 In order to reach the main aim of CycleOn, to lower the number of accidents with elderly cyclists,

95 two sub-aims have been formulated: to create awareness about cycle safety and safer cycling

96 behaviour. Behavioural change is complex and depends on many internal and external factors.

97 In order to visualize this process, we used the integrated change model (I-change model) (De

98 Vries et al., 2003). This model shows that behavioural change is influenced by predisposition,

99 knowledge, awareness, motivation, intention, abilities and barriers (figure 1).
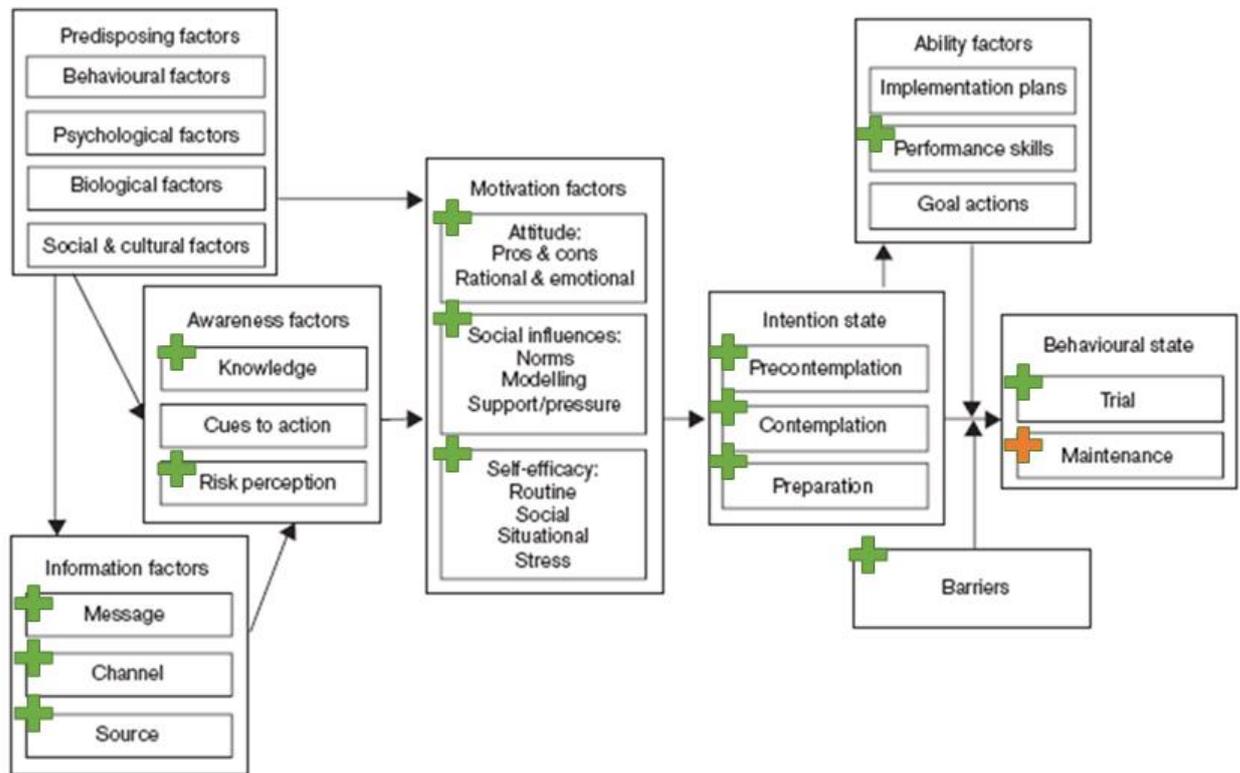
100   Figure 1. I-change model for CycleOn

101 Analysing CycleOn using this theoretical model, demonstrates that the large majority of aspects

102 of behavioural change (knowledge, awareness, motivation, intention, abilities, barriers and

103 finally behaviour) are addressed (see green plus-symbols in Figure 1). This is done by the

104 provision of information about safety concerns (and the attention for appropriate channels and

105 sources) and the availability of activities that make the elderly aware of the risks or targeting

106 behavioural change. One aspect that was relatively underexposed was retaining behavioural

107 changes on the long term (orange plus-symbol in Figure 1). More information about how

108 CycleOn addresses these aspects of behavioural change is reported in the CycleOn operations

109 manual (Ideate 2017).

110 Overall, these results show that it is theoretically plausible that participating in CycleOn leads to

111 the intended increase in awareness and behavioural change.

112 **3.2 Local implementation**

113 10 of all 12 provinces in the Netherlands and 85 municipalities take part in CycleOn. The two

114 remaining provinces have also shown their interest in CycleOn. A total of 40 coordinators of

115 participating municipalities were invited to fill out the questionnaire, of which 18 agreed to

116 participate. The results of the questionnaire show that during the time of assessment, the

117 majority of municipalities were still in a preparatory phase of CycleOn, which means that they

118 have not yet reached the implementation phase. In other words, no activities for the elderly

119 have been carried out yet. Therefore, no data on the impact of the program on behavioural

120 change are yet available. Nevertheless, the coordinators describe that they have established a

121 partnership with many local CycleOn partners: community sports coaches, sports clubs, cycling

122 unions, community centres and bicycle repair shops, among others. Coordinators were satisfied

123 with the level of support they received from the national organization.

124 Individual interviews with coordinators and focus groups with local CycleOn partners will be

125 conducted in June 2020. These interviews and focus groups will focus on coordinators' and local

126 partners' experiences in implementing CycleOn, the reach of the program in the specific

127 municipality, the cooperation between partners and maintenance of the program. At ICSC 2020,

128 the first results of these interviews will be presented.

129 **3.3 Individual Interviews elderly cyclists**

130 Interviews with elderly cyclists will take place in 2021. These interviews will focus on the elderly's

131 experiences with CycleOn and experienced effects on changes in awareness and behaviour.

4   DISCUSSION

The implementation of CycleOn is still in its early stages. The majority of the surveyed municipalities are still preparing to carry out activities. This means that the results of the questionnaire about the reach of the program and the level of implementation are limited. Moreover, because of the COVID-19 pandemic and the measures taken by the Dutch government, the activities of the program in the spring and summer of 2020 cannot be continued as planned. However, first results show that municipalities have found new ways of implementing CycleOn, for example by providing information about safety concerns online. Almost all provincial authorities in the Netherlands have included CycleOn in their policy and implementation plans, and despite the COVID-19 pandemic, CycleOn is gradually being adopted and elaborated in the municipalities. Planned activities and communication means will in all likelihood be (perhaps in an adjusted form) implemented in the fall of 2020 and in 2021. This still shapes, however, the context for further results of this study.

5   CONCLUSIONS

CycleOn is an innovative program that aims to increase cycling safety among the elderly by focusing on increasing awareness before targeting behavioural change. First results demonstrate that this new approach is theoretically well described and is therefore likely to be effective in increasing awareness about cycle safety among elderly cyclists, encouraging behaviour change and therefore increasing cycling safety. During this study, most municipalities were still in a preparatory phase of CycleOn and had not yet implemented any activities for the elderly. The current study continues, slightly influenced by the COVID-19 pandemic, with a national evaluation of the program using a system approach that will provide results on the effectiveness, implementation and adoption of CycleOn. These results will be presented at ICSC 2020.

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