

Development of a questionnaire measuring preventive behaviors at work

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1 **Abstract**

2

3 *Purpose.* This study aimed to develop a questionnaire measuring preventive behaviors at work. *Methods.* A
4 three-step design, including qualitative and quantitative methods, was followed: (1) item generation, (2)
5 experts' validation of content, and (3) pretesting. *Results.* For step 1, 49 relevant existing scales were
6 reviewed, and a pool of 172 items was generated. Redundant items were deleted (n = 48), and unclear items
7 were reworded (n = 27). For step 2, 14 experts (five occupational therapists, four researchers, and five
8 workers) assessed the representativeness, relevance, and clarity of each item through content validity indices
9 (CVIs). An average overall CVI of 0.97 was obtained, and 87.5% of the experts stated that the questionnaire
10 was comprehensive. During this step, 63 items were deleted, and 35 were modified. For step 3, the tool was
11 pretested in the clinical settings of four dyads (occupational therapist–worker). The thematic analysis of
12 interview content allowed several changes to be made to the questionnaire, including the addition of
13 information and format changes. *Conclusions.* Overall, this three-step study led to the construction of a 61-
14 item French questionnaire entitled the *Échelle de fréquence des comportements préventifs au travail*
15 [Frequency Scale of Preventive Behaviors at Work]. In rehabilitation settings, this tool could be useful to
16 support professionals in enabling workers to adopt preventive behaviors, thereby fostering a healthy,
17 sustainable return to work after a disability period. However, further metrological property assessment is
18 required. A validating study using a large pool of workers is ongoing.

19

20 **Keywords:** Questionnaire design, Preventive behavior, Occupational rehabilitation, Workers, Frequency
21 scale

22

23 **Introduction**

24 With over 374 million nonfatal occupational accidents and 3 million work-related deaths occurring
25 worldwide each year [1], work-related health problems represent a major public health concern. Whether
26 work accidents, occupational diseases, or common mental disorders, work-related health problems not only
27 result in individual consequences such as reduced functioning or quality of life [2] but also affect
28 organizations, thereby decreasing performance, productivity, and innovation [3]. The economic burden of
29 work-related health problems is also impressive, with an estimated annual cost of more than \$12 billion in
30 Canada [4]. Despite technological advances in occupational health and safety, the situation remains worrying.
31 For instance, in Quebec (Canada), work-related injuries and diseases increased by 6% and 18% between 2017
32 and 2018, respectively [5]. The proportion of injured workers requiring rehabilitation services before
33 returning to work also grew, with an increase of 3% between 2006 and 2012 [6]. Although most people return
34 to work after a period of rehabilitation, many have difficulty remaining at work in the long term [7]. For
35 instance, up to 15% of workers had at least one relapse, recurrence, or worsening of their health problem
36 after returning to work [8], creating barriers to sustainable employment after rehabilitation. Furthermore,
37 because the global workforce is aging [9], issues are to be expected in the future as the period of disability is
38 often longer for these workers, and the success of the return to work is less certain [10].

39 To promote sustainable employment after rehabilitation, factors related to rehabilitation services,
40 compensation systems, workplaces, and individuals should be addressed because of their recognized impact
41 on the prevention of prolonged disability [11]. Concerning individual factors, preventive behaviors that
42 workers may adopt would be of great interest [12]. The influence of workers' behaviors on the risk of work-
43 related health problems has been shown in several studies conducted with various worker populations [12-
44 14]. Accordingly, the concept of preventive behaviors has gained interest in recent years and has been the
45 subject of several studies.

46

47 *Model of Preventive Behaviors at Work*

48 Recent studies have defined the model of preventive behaviors at work (MPBW) to explain preventive
49 behaviors [15]. The MPBW defines the behaviors workers may adopt to foster their own health, safety, and
50 wellbeing, as well as their colleagues', thereby contributing to the overall organization. In accordance with
51 the World Health Organization's definition of health [16], these behaviors allow acting on the physical,
52 mental, and social components of health. Figure 1 shows the MPBW visual representation [15].

53 Furthermore, the MPBW exposes six major preventive behaviors, namely, (1) ***adopting a reflective practice***
54 (e.g., analyzing work situations, identifying risks, and taking decisions for one's health); (2) ***pondering of***
55 ***rules and procedures*** (e.g., respecting work-related procedures or wearing personal protective equipment but
56 also questioning those and suggesting modifications); (3) ***taking initiatives for health, safety, and wellbeing***
57 (e.g., being involved in health and safety committees or seeking help from available resources); (4) ***caring***
58 ***about others*** (e.g., helping colleagues or listening to one another); (5) ***communicating*** (e.g., expressing one's

59 needs or reporting risks); and (6) *adopting a healthy lifestyle* (e.g., having a balance between work and
60 personal life or having means to manage stress).

61 *Please insert Figure 1 here*

62 **Figure 1.** Model of preventive behaviors at work

63 The MPBW shows a systemic and multifactorial view of preventive behaviors. The behaviors are meant to
64 be universal, but their manifestations (see the examples in the parentheses above) are largely influenced by
65 contextual factors related to individuals, organizations, or society. Figure 1 presents a dotted line surrounding
66 engagement in preventive behaviors, meaning that these behaviors cannot be considered independently from
67 the context in which they are adopted.

68 The MPBW also considers the outcomes of preventive behaviors. The outcomes are generally positive for
69 workers, organizations, and society. These outcomes impact the physical, mental, and social aspects of health.
70 Moreover, the outcomes are embedded in the context, and the spiral arrow in Figure 1 connects the outcomes
71 to the context, suggesting a dynamic influence between the components of the MPBW. Although outcomes
72 are the result of engagement in preventive behaviors, they can, in turn, contribute to creating a context
73 favorable to engagement in preventive behaviors. This reciprocal effect may perpetuate prevention efforts.

74 As health, safety, and wellbeing must be handled by all individuals in an organization [17], the MPBW
75 proposes the engagement of workers by identifying behaviors to adopt. However, this engagement cannot
76 stand by itself; it must be supported by a favorable context, especially an organizational context that offers
77 workers the possibility to engage in preventive behaviors.

78 As part of a transdiagnosis approach, the MPBW has the advantage of being generic and relevant to various
79 workers' realities, regardless of the nature of their health problems. The development process [15] and the
80 validation study [18, 19] of the MPBW are detailed elsewhere.

81

82 *Relevance for the Development of a Preventive Behavior Measure*

83 Enabling workers who have suffered a work-related health problem to adopt preventive behaviors is a
84 relevant goal to pursue in rehabilitation, particularly promoting a healthy and sustainable return to work for
85 these individuals. Furthermore, the adoption frequency of the behaviors appears to be pivotal for them to
86 become habits and be part of the day-to-day lives of individuals. In fact, the results of a recent systematic
87 review about the maintenance of behavior change have confirmed that the most sustainable mechanism for
88 maintenance is to develop the automaticity of the behaviors and to include it in one's routine [20]. Integrating
89 behaviors by repeating them frequently helps integrate them into habits and routines, making them part of a
90 person's identity [21]. Because identity refers, among other things, to a person's values and beliefs, behaviors
91 that are consistent with identity are more likely to be maintained in the long term [21]. Thus, the frequent
92 adoption of preventive behaviors can lead workers to be more engaged in health, safety, and wellbeing and
93 make prevention an integral part of their professional identities.

94 The literature also validates that rehabilitation professionals have the skills, knowledge, and expertise
95 required to implement interventions aiming at bringing people to change their behavior to preserve their

96 health [22], especially with regard to work [23]. Findings from a recent study have corroborated that
97 rehabilitation professionals use multiple interventions to enable workers to adopt preventive behaviors [24].
98 For instance, occupational therapists provide individualized education about postural hygiene and load
99 handling, encourage workers to report occupational health and safety risks, and teach new working methods
100 [24]. However, some issues limit rehabilitation professionals' ability to measure workers' behaviors, as the
101 possibility of having a complete picture of workplace factors influencing the behaviors of workers is limited.
102 Thus, it becomes essential for rehabilitation professionals to have access to valid clinical tools. The scientific
103 literature review suggests gaps in the form, content, and validity of the tools available to measure preventive
104 behaviors [25, 26]. Existing measurement tools make the evaluation of some of the six behaviors described
105 in the MPBW possible, but none combine them into a single tool developed and validated by research. For
106 instance, the *pondering of rules and procedures* and *taking initiatives for health, safety, and wellbeing*
107 behaviors are partly captured by the *compliance and participation scales* developed by Griffin and Neal
108 (2000) [27]. The *communicating* behavior is also captured by the *safety voice scale* of Tucker et al. (2011)
109 [28]. Another example is *the behavior of caring about others*, which is partly measured by the *safety*
110 *citizenship and behavior scale* of Hofmann et al. (2003) [29]. This lack of a tool measuring the full range of
111 characteristics defining preventive behaviors has been previously identified in the current literature [25].
112 Furthermore, the metrological properties of the available tools are poorly documented [26]. These gaps can
113 be an issue for clinical application, as they may impair the ability of professionals to measure the preventive
114 behaviors of workers. As the assessment represents the basis of occupational rehabilitation interventions,
115 offering a complete, valid, and reliable measuring tool for preventive behaviors is essential.

116 The next logical step to continue developing new knowledge about this emerging topic is to design an
117 evaluation tool to measure the preventive behaviors that workers can adopt. What behaviors do they adopt?
118 How often? Why some are adopted more than others? A valid and reliable measuring tool is necessary to
119 answer these questions. As the adoption frequency of preventive behaviors is related to a sustainable behavior
120 change [20, 21], this study aims to develop a measuring tool for the adoption frequency of preventive
121 behaviors at work.

122 Several research steps must be conducted to develop a new measuring tool. However, few authors have
123 reported the development steps and have chosen to highlight the results of the metrological property analysis
124 [30]. Consequently, readers are unaware of the rationale that has guided the decisions throughout the tool
125 development process. A review of 117 studies confirmed that 82% of authors failed to describe the
126 development process or the methods employed to pretest the new tool they intended to develop [31].
127 Methodological transparency has become an important part of research best practices in various fields, and
128 disclosing the details of all relevant research processes can strengthen rigor and reliability [32]. Transparency
129 also plays a major role in evaluating and replicating study results [33]. Thus, improving transparency could
130 contribute to creating more valid and relevant tools for research and clinics [34]. Among other things, it is
131 recommended that tool development studies report on (1) how items were generated and reduced, (2) how
132 each question and response options were formatted, and (3) how the tool was pretested [35]. Following these

133 recent recommendations, this article describes the development process of the new measuring tool for the
134 adoption frequency of preventive behaviors at work.

135

136 **Method**

137 *Design.* On the basis of a measuring tool development study design [36], a self-administered questionnaire
138 was developed and submitted for first validation. A self-administered format was chosen based on the
139 following advantages: (1) it is easy to administer, inexpensive, and little or not influenced by the evaluator;
140 (2) it can also be easily integrated into the systematic assessment process of people receiving occupational
141 rehabilitation services [37]; and (3) this type of tool is complementary to other frequently used assessments
142 in occupational rehabilitation, such as interviews or task observations.

143 Step 1. Item Generation

144 *Procedure and analysis.* The first step aimed to generate a pool of items to measure the six behaviors of the
145 MPBW (Figure 1). To do so, a literature review was conducted to see how items are formulated in different
146 existing scales that evaluate similar constructs. The search was conducted through PsycTest, PsycNet,
147 MEDLINE, CINAHL, and Google Scholar. Specific keywords (e.g., questionnaire, test, scale, behavior,
148 prevent*, work*, health*, safe*, communication, life habits, initiatives, and respect of rules) were utilized
149 within distinct combinations for each preventive behavior. For feasibility reasons, only articles published in
150 English or French were consulted. Relevant scales were then listed and reviewed to collect information on
151 content, rating scale, and instructions.

152 For the generation of items, general writing principles were followed to ensure that items were short, concise,
153 and simple to read (e.g., avoiding jargon, abbreviations, double-barreled items, or items with more than 20
154 words) [38-41]. Items were assembled in a questionnaire format and refined for clarity and structure. A
155 careful analysis was conducted by two members of the research team to ensure that the items fit with the
156 purpose of the questionnaire and with the theoretical definition of the behaviors [38], as defined by the
157 MPBW.

158 In addition, a frequency rating scale was chosen because it is consistent with the aim of determining how
159 often workers adopt each preventive behavior [42]. The literature suggests that the number of response
160 choices should be between five and seven, but which option is preferred and more valid is still under debate
161 [36]. For instance, the use of a 5-point scale (i.e., never, rarely, sometimes, often, and always) seems to be
162 advised for studies with the general population or when participants do not have experience with
163 questionnaires, but a 7-point scale (i.e., never, rarely, occasionally, sometimes, often, most of the time, and
164 always) would be more accurate and easier to use [43]. Thus, the two options were selected for further expert
165 evaluation. Finally, the title and instructions were developed to ensure that the questionnaire was adequate
166 for self-administered use.

167 Step 2. Experts' Validation of the Content

168 *Participants.* Ten experts were recruited using a purposive sample strategy. The inclusion criteria entailed
169 being a health professional (e.g., occupational therapist, physiotherapist, nurse, and psychologist) and having

170 clinical or research experience of at least two years in the field of occupational rehabilitation. Given that the
171 relevance of including stakeholders in the panel of experts is now recognized, five workers with at least two
172 years of work experience were also recruited. During the recruitment process, special attention was given to
173 recruiting an equal proportion of men and women of various ages, as gender and age are variables frequently
174 studied in relation to success of return to work [e.g., 44] and the adoption of preventive behaviors [e.g., 45]
175 .

176 *Procedure.* An important step in questionnaire development is to determine the content validity and whether
177 the type and number of items in the questionnaire truly measure the content domain [46]. An often-used
178 method to assess content validity is to ask experts to review the questionnaire and its items on a few
179 indicators. This content validity was assessed using quantitative and qualitative data.

180 Experts received a personalized email describing the (1) MPBW, (2) newly developed questionnaire, and (3)
181 instructions for the validation process, and they were first asked to assess the title and instructions of the
182 questionnaire qualitatively. They were also invited to write suggestions or modifications that could improve
183 clarity. Thereafter, they had to vote for the rating scale they found clearer.

184 For individual items, the experts were asked to judge each of them in terms of (1) *representativeness* to the
185 content domain, (2) *relevance* to the construct, and (3) *clarity* and wording [47] on the basis of a 4-point
186 Likert scale (1 = item is unrepresentative/irrelevant/unclear, 2 = item needs a major revision to be
187 representative/relevant/clear, 3 = item needs a minor revision to be representative/relevant/clear, and 4 = item
188 is representative/relevant/clear) [47]. The experts were also encouraged to make suggestions or corrections
189 on wording or grammar at any point in the validation process. Finally, they were asked to evaluate the
190 comprehensiveness of the entire questionnaire and whether all the items together were enough to measure
191 the frequency of the six preventive behaviors at work. They were also invited to provide feedback on items
192 that could be added or deleted [48]. Figure 2 presents a sample of the validation questionnaire.

193 *Please insert Figure 2 here*

194 **Figure 2.** Sample of the validation questionnaire*

195 *This sample of the validation questionnaire was translated into English for the purpose of this publication;
196 the original was in French.

197 *Analysis.* The quantitative data were compiled, and the descriptive statistics were calculated. The content
198 validity indices (CVIs) were calculated to show the proportion of agreement between the experts on each
199 item indicator (i.e., representativeness, relevance, and clarity). The literature suggests that items with a CVI
200 of below 0.70 be eliminated and that items with a CVI of between 0.70 and 0.79 be modified. A CVI of 0.80
201 or higher is considered adequate [47, 48]. A CVI was also calculated to measure the overall agreement scores.
202 For a newly developed questionnaire, it is recommended that the overall CVI be at least 0.80 [48]. Qualitative
203 data, such as suggestions and comments, were synthesized and analyzed using a thematic analysis [49]. The
204 decision to maintain, delete, or modify an item was made through discussion between the research team
205 regarding quantitative and qualitative results. For instance, even if items obtained high CVIs (i.e., > 0.80), if

206 experts considered them redundant or irrelevant based on qualitative validation data, then the items may have
207 been deleted or modified.

208 Step 3. Pretest

209 The next step of validation was to assess the acceptability and applicability of the questionnaire by knowledge
210 users. This step would allow one to determine if the questionnaire could be implemented in the context of
211 occupational rehabilitation and if people delivering or completing the questionnaire would consider it
212 appropriate in terms of cost, effort, and effectiveness [50].

213 *Participants.* Four dyads composed of one occupational therapist and one worker were recruited on the basis
214 of the following inclusion criteria: workers had to 1) be on sick leave due to a work-related health problem,
215 2) receive rehabilitation services aiming at returning to work, and 3) have good knowledge of French.
216 Occupational therapists had to work in occupational rehabilitation for at least two years. The chosen
217 participants did not take part in the previous steps of the study.

218 *Procedure.* After completing the newly developed questionnaire, the participants' perceptions were collected
219 through a semi structured interview. An interview guide was developed according to key acceptability and
220 applicability indicators (e.g., facilitators, barriers, and availability of resources) [50]. Qualitative and
221 quantitative questions were also included. For instance, the participants had to rate their level of agreement
222 regarding the simplicity of the questionnaire on a Likert scale and explain how they found it useful in the
223 context of occupational rehabilitation. The interview guide was previously submitted to a pretest, and the
224 interviews were recorded to facilitate the analysis.

225 *Analysis.* Descriptive statistics were calculated to analyze the quantitative data, and the qualitative data were
226 synthesized and analyzed using thematic analysis [49].

227

228 **Ethics.** This study received ethical approval from the ethics board of the Centre intégré universitaire en santé
229 et services sociaux de la Capitale-Nationale, project #2019-1814.

230

231 **Results**

232 This study used a rigorous development process to create *Échelle de fréquence des comportements préventifs*
233 *au travail* [Frequency Scale of Preventive Behaviors at Work]. The questionnaire aims to assess the
234 frequency with which workers adopt preventive behaviors. The questionnaire evaluates the six preventive
235 behaviors described in the MPBW [15]. A short definition of each behavior is presented in the questionnaire,
236 followed by items measuring its adoption frequency through different possible manifestations. Figure 3
237 exposes the evolution of the questionnaire development according to the three research steps. The final
238 version of the questionnaire after this development study is available in Appendix 2. This version will be
239 submitted to further metrological validation.

240

Please insert Figure 3 here

241 **Figure 3.** Evolution of *Échelle de fréquence des comportements préventifs au travail* [Frequency Scale of
242 Preventive Behaviors at Work] according to the three research steps

243

244

245 Step 1. Item generation

246 The literature search found 49 relevant articles¹ on the measure of preventive behaviors at work or related
247 constructs. The extraction of the information contained in those articles allowed the generation of a pool of
248 172 items. Redundant or similar items were deleted (n = 48), and unclear or longer items were reworded (n
249 = 27), thereby reducing the number of items to 124.

250 Step 2. Experts' validation of content

251 Fourteen out of the selected 15 experts completed the validation questionnaire (five occupational therapists,
252 four researchers in occupational rehabilitation, and five workers). The final sample of experts included nine
253 women and five men ranging from 24 to 59 years old (\bar{x} = 37). All workers were currently employed; three
254 had a period of work disability, and two received occupational rehabilitation services.

255 Of the 124 items evaluated, 99 obtained representativeness, relevance, and clarity average CVIs higher than
256 0.80; 17 earned at least one average CVI between 0.70 and 0.79; and 8 acquired at least one average CVI
257 below 0.70. Several qualitative comments were written by experts, and the reasons for revising or deleting
258 items concerned (1) redundancy of content, (2) relevance to the reality of workers, and (3) wording. At this
259 step, 63 items were eliminated, 35 were modified, and 26 were unchanged.

260 Thus, the revised questionnaire contained 61 items distributed unequally into the six preventive behavior
261 subscales (adopting a reflexive practice = 10 items, pondering of rules and procedures = 11 items, taking
262 initiatives for health, safety, and wellbeing = 11 items, caring about others = 11 items, communicating = 12
263 items, and adopting a healthy lifestyle = 6 items). On the basis of the experts' ratings, the average overall
264 CVI for the representativeness, relevance, and clarity of the revised questionnaire (n = 61 items) was 0.97. A
265 total of 87.5% of the consulted experts noted that the questionnaire was entirely comprehensive. For the
266 rating scale, the results verify that the 5-point scale was preferred (n = 8) over the 7-point scale (n = 6). Thus,
267 the 5-point frequency scale (never, rarely, sometimes, often, and always) was retained.

268 Step 3. Pretest

269 Four dyads consisting of an occupational therapist and a worker participated in the pretesting phase of the
270 study. The occupational therapist sample included three women and one man whose ages ranged from 31 to
271 52 (\bar{x} = 43). Three worked in a public rehabilitation center, and one worked in a private clinic. Their years
272 of work experience in occupational rehabilitation varied between 6 and 24 years (\bar{x} = 12). The worker sample
273 comprised two women and two men whose ages ranged from 37 to 52 (\bar{x} = 45). They also had diverse job
274 titles (e.g., clinical nurse, litigation advisor, and beneficiary attendant) and had years of work experience
275 varying from 8 to 31 (\bar{x} = 20). All the workers had at least one work disability period, and all received
276 occupational rehabilitation services, such as occupational therapy, physiotherapy, or psychology. The
277 thematic analysis of interview content allowed several changes to be made to improve the questionnaire

¹The list of the 49 articles consulted is available in Appendix 1.

278 according to the opinions of the participants. For instance, a participant expressed the need to change the
 279 format of instructions to highlight specific and important words: “Maybe the instructions could be framed
 280 and capitalized. I would also put *typical work week* in bold.” Another participant suggested a need for
 281 conciseness in the description of the behaviors evaluated by the questionnaire: “The description of the
 282 categories could be slightly more simplified so that it does not burden the questionnaire.” A participant
 283 expressed concern about the possibility that some of the behaviors may be less relevant for some types of
 284 work. This participant proposed adding a *not applicable* option to the response scale: “I would add the *not*
 285 *applicable* option; otherwise, a worker may not answer the question or give a false response.” Table 1 shows
 286 the key changes suggested during the pretest.

Table 1 Key changes suggested during the pretest

Section	Changes
Instructions	Four changes were made to the instructions (e.g., add in bold that answers should refer to a typical work week, invite people to answer as honestly as they can).
Category description	Three descriptions of preventive behaviors were simplified (1, 3, and 5).
Items	Six items were reformulated (2.1, 2.10, 5.2, 5.6, 5.7, and 5.9).
Response options	A <i>not applicable</i> option was added for each item. A comment box was included for each category of behavior to express qualitative information (e.g., factors impacting the adoption frequency of behaviors).
Interpretation	A section explaining how to interpret the results was added.

287

288 **Discussion**

289 This article aimed to describe the steps of the development of a new questionnaire entitled *Échelle de*
 290 *fréquence des comportements préventifs au travail* [Frequency Scale of Preventive Behaviors at Work]. To
 291 the best of our knowledge, this is the first tool to measure the adoption frequency of preventive behaviors at
 292 work, as described by the MPBW. We followed available guidelines to conduct rigorous and transparent
 293 research for the three development steps of item generation, expert validation of content, and pretest. As it is
 294 an emerging tool, transparency is particularly important to provide readers with trustworthy information to
 295 replicate the study or adopt the proposed method in future studies [32]. In doing so, this study contributes
 296 theoretical, practical, and methodological knowledge.

297

298 Theoretically, this study contributes to the advancement of knowledge about MPBW and the engagement of
 299 workers in preventive behaviors at work. The development of a questionnaire based on a theoretical model
 300 makes it possible to offer empirical validation [51]. Moreover, the development of a questionnaire allows
 301 clarification of the underlying theoretical concepts [52]. In addition to the validation study with experts that
 302 had previously been carried out on MPBW [18, 19], the development of the questionnaire offers a second
 303 rigorous validation tool. Authors have suggested that a sound measurement is a necessary condition for the

304 advancement of theoretical scientific knowledge and that a fair measurement tool depends on the quality of
305 its methodological process [53]. This article on the development of *Échelle de fréquence des comportements*
306 *préventifs au travail* [Frequency Scale of Preventive Behaviors at Work] thus contributes to the advancement
307 of knowledge about the theories of workers' engagement in preventive behaviors. A measurement tool is
308 more likely to be used in other studies or cited if its theoretical foundation is firmly described, as in this
309 article [53]. This article explains the development process and the theoretical basis of the questionnaire and
310 increases its chances to be employed by scholars, thereby contributing to the development of future
311 knowledge. Finally, as the tool development process was carried out by considering the current literature
312 (i.e., 49 existing scales - see Appendix 1), an attempt was made to make the new tool coherent and
313 complementary to the existing questionnaires. Our study made it possible to not repeat information from
314 existing tools but to fill in the gaps in the current state of knowledge.

315

316 On a practical level, this study developed a measurement tool for preventive behaviors that workers may
317 adopt. As preventive behaviors are among the factors influencing the success of a sustainable return to work
318 after a period of disability [11], a valid tool will support rehabilitation professionals in enabling workers to
319 adopt those behaviors. The questionnaire could not only be useful to plan and monitor rehabilitation
320 interventions enabling workers to adopt behaviors but could also make a direct contribution to developing
321 behaviors among workers. Authors have recently proposed “question-effect behavior,” which suggests that
322 answering questions about a behavior produces a small-sized change in the subsequent performance of that
323 behavior [54]. In addition to being a measurement tool, the questionnaire also represents a method for
324 achieving the objectives of occupational rehabilitation.

325

326 This development study was conducted in the context of occupational rehabilitation. However, the scope of
327 the questionnaire exceeds it. The MPBW gives an important place to the context in which preventive
328 behaviors are adopted. Studies on behavior-based safety approaches found that measuring frequency and
329 offering feedback to workers about the behaviors they adopt is a highly cost-effective method [55]. This idea
330 of providing feedback to workers regarding their behaviors was also recognized as a winning condition for
331 facilitating sustainable behaviors [56]. The MPBW recognizes that preventive behaviors are largely
332 influenced by the context in which they are adopted, especially workplaces. Thus, using the questionnaire in
333 workplace practices to offer recognition and reinforcement could be an interesting avenue to stimulate the
334 engagement of workers in preventive behaviors. Because other authors have suggested that behavioral habits
335 and routines are learned by repetition in relation to a context [57], the use of the questionnaire may go beyond
336 the context of rehabilitation. In accordance with the integrated view of prevention [58], the use of the
337 questionnaire in the workplace may potentially enable workers who have had a period of disability and those
338 in employment whether or not they experience a health-related problem. Other studies will be conducted to
339 validate these ideas.

340

341 On a methodological level, this study combined qualitative and quantitative methods. Even if purely
342 quantitative studies are still dominant, the benefits of combining qualitative and quantitative methods have
343 been exposed in previous tool development studies [59]. While the quantitative methods and statistical
344 treatment of data offer objective referents to decide on maintaining, rejecting, or modifying different elements
345 of a questionnaire, qualitative methods allow in-depth comprehension of the participants' experiences [60].
346 The results of this study asserted that qualitative methods were useful with the group of experts helping
347 identify redundant, irrelevant, or wordy items despite them having a quantitatively high CVI. If we had only
348 employed quantitative values, we would not have been able to provide nuances and clarifications to several
349 elements of the questionnaire. Qualitative methods can also offer more insights into the revisions of newly
350 developed instruments (e.g., rewording or removing items) and validate the accuracy of quantitative data
351 [61]. Qualitative methods allow the collection of information about beliefs, perceptions, and local contexts
352 of the targeted population [62], which are key factors in ensuring that the developed questionnaire meets the
353 population's needs. Qualitative methods may optimize the applicability and usability of the questionnaire
354 among the targeted population.

355

356 *Strengths and Limitations*

357 This article presented the development process of a questionnaire assessing the full range of the
358 characteristics of preventive behaviors at work. This contribution responds to a breach in the state of current
359 knowledge. The systematic methodology used optimizes the assurance that the questionnaire meets the
360 research needs of scientists and the clinical needs of rehabilitation professionals while being adapted to the
361 reality of workers. The creation of *Échelle de fréquence des comportements préventifs* [Frequency Scale of
362 Preventive Behaviors at Work] is particularly important for French workers, for whom the use of valid
363 questionnaires is scarce.

364 This study still has some limitations. First, readers are encouraged to use caution in interpreting results due
365 to the small sample size. Having conducted the study with more participants of different profiles, particularly
366 in terms of job titles or rehabilitation services received, could have yielded different results. However, our
367 sample size is acceptable, as a previous report suggested that a minimum of five experts should be recruited
368 for content validity studies [63]. Additionally, although we intended to have an equal proportion of men and
369 women, our expert sample included almost twice as many women as men, which may lead to gender bias. A
370 social desirability bias cannot be ruled out related to the self-administered modality of the scale. Indeed,
371 people may tend to report adopting more preventive behaviors than they actually do. Combining the use of
372 the scale with an observation modality could attenuate this bias. Furthermore, the development of the
373 questionnaire has taken place in the context of occupational rehabilitation, which limits the generalizability
374 of its use in other settings, such as the workplace. In addition, this study made it possible to develop a measure
375 addressing the preventive behaviors workers can adopt, but does not consider the contextual factors that
376 influence them. As contextual factors are crucial in the MPBW, work will have to be conducted to measure
377 them. Finally, the next step of this research is to measure the metrological properties of *Échelle de fréquence*

378 *des comportements préventifs* [Frequency Scale of Preventive Behaviors at Work] by validating it with a
379 large pool of workers.

380

381 **Conclusion**

382 The newly developed *Échelle de fréquence des comportements préventifs au travail* [Frequency Scale of
383 Preventive Behaviors at Work] is currently the only available French questionnaire to measure the adoption
384 frequency of preventive behaviors at work as described by the MPBW. Through rigorous and transparent
385 methodology, we offer a tool based on a firm theoretical foundation that could be utilized in various clinical
386 settings. However, appraising the validity and reliability of the tool to support its research and clinical use is
387 important. Studies assessing metrological properties within divergent target populations are ongoing.
388 Theories of workers' engagement in preventive behaviors are constantly evolving, and research has to
389 innovate in that field.

390

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395 **Disclosure statement**

396 No conflict of interest to declare

397

398 **Compliance with Ethical Standards**

399 **Conflict of interest**

400 None of the authors have any conflicts of interest to declare.

401 **Ethical Approval**

402 All procedures performed in studies involving human participants were in accordance with the ethical
403 standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and
404 its later amendments or comparable ethical standards.

405 **Informed Consent**

406 Informed consent was obtained from all individual participants included in the study.

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