Cross-cultural Adaptation of the Cardiff Fertility Knowledge Scale and the Fertility Status Awareness Tool for the French-Canadian Population

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ABSTRACT

OBJECTIVE: The Cardiff Fertility Knowledge Scale (CFKS) and the Fertility Status Awareness Tool (FertiSTAT) are validated tools allowing the evaluation of fertility knowledge and raising awareness about risk indicators for reduced fertility. Their use by health care professionals practicing in the field of reproductive health might optimize fertility of the Canadian population. However, there currently is no version of these questionnaires for the French-Canadian population. The objective of this study was to translate and culturally adapt the CFKS and FertiSTAT to the French-Canadian population.

METHODS: The translation and adaptation of the questionnaires was completed following a 4-stage approach: 1) forward translation, 2) synthesis, 3) expert committee review, and 4) testing of the prefinal version of the questionnaires. The testing stage was conducted with a sample of 30 women and 10 men.

RESULTS: During the translation process, linguistic difficulties were met for some items of both questionnaires but were resolved by consensus of the expert committee. Thirty women and 10 men tested the prefinal version of the CFKS-F and FertiSTAT-F. On a 5-point Likert scale, the global comprehension was 4.8±0.5 and 4.6±0.6, respectively. Based on the comments of the participants, the expert committee made minor modifications in the final version of the questionnaires to clarify the formulation of questions and adapt to one medical term.

CONCLUSION: Tools to assess fertility knowledge and the presence of risk indicators for reduced fertility are now available for health care professionals practicing in the field of reproductive health. (243)

KEY WORDS: Translation; Questionnaires; Fertility; Knowledge; Risk factors.
INTRODUCTION

Infertility is a global public health issue in developed countries. In Canada, it is estimated that approximately 10% of couples are infertile \(^1\). Notably, there is a rise in the adoption of social behaviors that reduced fertility, such as delaying childbearing \(^2\). In addition, an important proportion of adults of reproductive age are exposed to several environmental and lifestyle factors as well as health conditions that may interfere with their fertility, such as obesity, tobacco, alcohol and drug consumption, or sexually transmitted infections \(^3,4\). Several studies have reported inadequate knowledge about factors that may reduce fertility \(^5-7\), which might explain, at least in part, sub-optimal fertility behaviors \(^8\). Importantly, providing fertility education has been shown to increase fertility knowledge \(^9,10\) and to reduced risk factors for reduced fertility \(^11\). Education and awareness campaigns should therefore be considered as means to increase fertility knowledge and improve fertility.

Two validated tools are available to assess fertility knowledge and increase awareness about risk factors for reduced fertility. The Cardiff Fertility Knowledge Scale (CFKS) has been developed to assess fertility knowledge \(^6\). This questionnaire includes 13 true/false/don’t know items related to fertility facts, risks and myths. To raise awareness about fertility, the Fertility Status Awareness Tool (FertiSTAT) has been developed by the same research team \(^8\). It is a self-administered, multifactorial tool that includes a list of risk indicators for reduced female and male fertility that are color-coded according to the gravity of risk (blue, yellow, orange and red). These independent risk indicators for reduced fertility have been identified from the empirical literature \(^8\) and are consistent with indicators used in clinical practice. Then, guidance is provided to inform women and men on how to protect their fertility according to the presence of risk indicators for reduced fertility. The FertiSTAT is intended for women and to consider her male
partner fertility status she has to complete specific sections of the questionnaire for him. The FertiSTAT is available online (http://www.fertistat.com/).

These questionnaires, however, are only available in English and Japanese (CFKS) or English and Spanish (FertiSTAT), and consequently cannot be used in French-speaking populations. In order to use these questionnaires in a different cultural background, it is important that the items be adequately translated but also culturally adapted. As stated by Epstein et al. 12, there is a distinction to be made between the translation and adaptation process. Indeed, the translation represents the production of a document from its original language into the target one. The adaptation process, on the other hand, considers possible cultural differences to be addressed in order to maintain equivalence of meaning when translated into the target language. Beaton et al. {Beaton, 2000 #2} proposed a process of cross-cultural adaptation that produces, when well conducted, equivalency between source and target based on content. The objective of the present study was to translate and culturally adapt the CFKS and FertiSTAT for the French-Canadian population.

**METHODS**

*Study design*

The cross-cultural adaptation process used in this study was based on the method proposed by Beaton et al. {Beaton, 2000 #2}. However, as recommended by Epstein et al. 12, we did not perform the back-translation as it does not add value when compared with the use of expert committee review only. Consequently, the translation and cultural adaptation of each questionnaire was completed following four stages: 1) forward translation, 2) synthesis, 3) expert committee review, and 4) testing of the pre-final version of the questionnaires (see Figure 1).
1) **Forward translation:** The forward translation from English to French was performed by two separate bilingual translators whose mother tongue was French. The first translator (S-MR) had a scientific background regarding reproductive health, and the second translator (GC) had neither medical nor clinical background related to the specific topic of the study.

2) **Synthesis:** The synthesis of the results of the translation was made by the two translators (S-MR and GC) in the presence of a recording observer (DB). A third version of both questionnaires was created by consensus at this stage.

3) **Expert committee review:** The expert committee was composed of the two translators who performed the forward translation (S-MR and GC), the author of the original questionnaires (JB), a professional translator whose mother tongue was French-Canadian (DL) and an obstetrician and gynecologist working in reproductive health (VB). The expert committee revised the three different translations of each questionnaire to consolidate the pre-final French-Canadian version of the CFKS (CFKS-F) and FertiSTAT (FertiSTAT-F). During this stage, attention was paid to semantic equivalence, idiomatic, experiential and conceptual equivalences.

4) **Testing of the pre-final version of the questionnaires:** To test the pre-final version of each questionnaire, adults of reproductive age (≥ 18 years old), born in Canada and whose mother tongue was French (defined as French-Canadian) were recruited using the snowball sampling method and via advertising social media. This study was approved by the local research ethics committee (CER-15-218-07.11) and all participants gave their informed consent. Participants completed a short questionnaire used to collect sociodemographic data as well as the CFKS-F (women and men) and the FertiSTAT-F (women). Participants were asked to rate on a 5-point Likert scale (where 1 is “not at all” and 5 is “absolutely”) their understanding of both questionnaires. Open questions were also asked to collect more details about items that were not
well understood. Items reported as problematic by more than 10% of participants were reviewed by the expert committee and modifications were made, if necessary, to produce the final version of the CFKS-F and FertiSTAT-F.

Data Analyses

Descriptive statistics were used to examine characteristics of the participants, overall understanding of each questionnaire, and to identify which items were not well understood. The t-test for independent samples was used to compare the levels of understanding of the questionnaires between men and women. All analyses were performed with IBM SPSS Statistics 24.0 (IBM Corp, Armonk, NY).

RESULTS

Forward Translation, Synthesis, and Expert Committee Review

During the translation process, linguistic difficulties were met for some items of both questionnaires. During the CFKS-F translation, difficulties relative to items 2, 6 and 10 through 13 were encounter. For item 2 “A couple would be classified as infertile if they did not achieve a pregnancy after one year of regular sexual intercourse (without using contraception)”, the expression “to achieve pregnancy” was difficult to translate in French. For some members of the expert committee, the expression included the notion of carrying a pregnancy to term (mener la grossesse à terme) and for others the notion of getting pregnant (mettre en route une grossesse). The second expression was finally preferred by the expert committee. For item 6 “If a man produces sperm he is fertile”, the synthesis of both translation suggested the direct translation Si un homme produit du sperme, alors il est fertile which implies that a man is fertile because he produces sperm. However, a member of the expert committee (professional translator) suggested
Un homme est fertile s’il produit du sperme which implies that if a man is fertile, he produces sperm. However, in order to respect the original meaning of the English version, the first formulation was chosen by the expert committee. For item 12 “If a man can achieve an erection then it is an indication that he is fertile”. Different French translations for “is an indication” were considered such as indication, preuve and signe; the expert committee decided to use signe. As for the FertiSTAT-F, minor linguistic changes were suggested by one member of the expert committee (professional translator). The expression “currently” was translated into French as actuellement instead of présentement, “frequently” as souvent instead of fréquement and “a pint of beer” as un verre de bière instead of une pinte de bière. Finally, the expression “units of caffeine” was translated into French as boissons cafénées instead of breuvages contenant de la caféine.

Testing of the pre-final version of the questionnaires

Forty participants (30 women and 10 men) living in the Province of Quebec tested the pre-final version of the CFKS-F and FertiSTAT-F. They were on average 32.5 years old and 50.3% of them had a university degree. Twenty-six percent had previously consulted a medical doctor for fertility problems and/or were trying to conceive for 12 months or longer. Thirty-eight percent were childless and had no plan to conceive a child in the near future.

The global comprehension of the CFKS-F on the 5-point Likert scale was 4.8±0.5 (women: 4.9±0.3; men: 4.3±0.7, p=0.0005). Six items (2, 7, 8, 9, 10 and 11) out of 13 were not well understood in terms of medical definitions, formulation or expression. In the final version of the questionnaire, three items were changed from the pre-final version. In item 2, the term “achieved a pregnancy” initially translated as mettre en route une grossesse was replaced by tomber enceinte even though it slightly differs from the English formulation. In item 10, the term “who
never menstruates” initially translated as qui n’a jamais eu ses menstruations was replaced by qui n’a pas ses menstruations and, for item 11, the term “she may not be able” initially translated into French as elle pourrait être incapable was replaced by elle pourrait ne pas être capable. As for the FertiSTAT-F, the global comprehension was of 4.6±0.6 on the 5-point Likert scale. Six items out of 20 were not well understood in terms of medical definitions, concept or layout. In the final version of the questionnaire, one item was changed from the pre-final version to adapt a medical term to the Quebec context (we added the term “infection pelvienne” to “maladie inflammatoire pelvienne”). The CFKS-F and FertiSTAT-F are available in the appendix.

**DISCUSSION**

Our study allowed the production of two tools evaluating fertility knowledge and raising awareness about fertility in the French-Canadian population. The translation and cultural adaptation process revealed few linguistic disagreements at the translation stage that were resolved by consensus of the expert committee. The testing of the pre-final version of both questionnaires showed that they were generally well understood by both men and women, although the understanding of the CFKS-F was lower in men. However, the expert committee made minor modifications based on the comments of the participants to clarify the formulation of three questions in the CFKS-F and adapt one medical term in the FertiSTAT-F. Nevertheless, these modifications are unlikely to affect the content validity of both questionnaires. The difficulty met for the translation of some items can be explained by the fact that scientific and medical health-related terms may be less commonly used in French lay language. Such difficulties have previously been reported in other French-Canadian translation and cross-cultural adaptation of English health questionnaires {Girard, 2016 #37;Parent-Vachon, 2008 #36;Roy,
Depending on the context, keeping either the scientific\textsuperscript{14,15} or lay language term can be appropriate\textsuperscript{16}.

\textit{Practical application}

Our questionnaires were tested by individuals living in the Province of Quebec, similarly to other health questionnaires that were translated and cross-culturally adapted for the French-Canadian population \cite{Girard, 2016; Parent-Vachon, 2008; Roy, 2014}. However, the terms and expressions used in our questionnaires are most likely suitable for all French-Canadian individuals. Therefore, the CFKS-F and the FertiSTAT-F have the potential to be used with any French-Canadians patients. Nevertheless, the comprehension of both questionnaires should preferably be tested beforehand if used by Acadians or Franco-Ontarians. Health care professionals practicing in the field of reproductive health now have access to validated tools assessing fertility knowledge and raising appropriate awareness about risk factors for reduced fertility in the French-Canadian population. The use of the CFKS-F and FertiSTAT-F may improve periconceptional counselling and education about fertility, either in the setting of primary or secondary prevention of infertility. However, whether improving fertility knowledge and raising awareness about the presence of risk indicators for reduced fertility will translates into engagement in fertility-optimizing behaviors is unknown. More research is therefore needed to test the predictive utility of the CFKS and FertiSTAT. Moreover, the FertiSTAT does contain a limited number of risk indicators for reduced fertility in men because at the time the FertiSTAT was developed, evidence was too inconsistent to add other risk indicators. Identifying additional significant risk indicators for reduced male fertility is thus needed and would allow developing a fertility status awareness tool targeting men.
Strength and limitations

Our study has several strengths. First, we used a rigorous process, as recommended by Beaton (2000) and Epstein (2015), to create a French-Canadian version of the CFKS and the FertiSTAT. Second, the author (JB) who contributed to the creation of both original questionnaires is bilingual (English and French) and was part of the expert committee. Her collaboration ensured equivalence of meaning between items of the original questionnaires and their French-Canadian versions. Third, the prefinal versions of the questionnaires were tested by both men and women who had various reproductive statuses (i.e. childless, with child, infertile undergoing fertility treatment), ensuring their validity and allowing their use among any adults of reproductive age who are interested in taking care of their fertility. Nevertheless, our study has some limitations that need to be acknowledged. First, the testing group was highly educated (50.3% had a university degree), which might have overestimated the global comprehension of the questionnaires. Second, more than one third of our sample were childless and had no plan to conceive a child in the near future. Thereby, our sample is less representative of the target population for the questionnaires, especially the FertiSTAT-F, which provides guidance for individuals trying to conceive.

CONCLUSION

The current study produced a satisfactory French-Canadian translation and cultural adaptation of the CFKS and FertiSTAT. The CFKS-F and FertiSTAT-F should be disseminated and used by French-speaking researchers, health care professionals and the population who are interested in reproductive health.
ACKNOWLEDGEMENTS

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REFERENCES


Figure 1. Diagram of the translation and validation process of the French-Canadian Cardiff Fertility Knowledge Scale (CFKS-F) and fertility status awareness tool (FertiSTAT-F)
Table 1: Characteristics of the participants

<table>
<thead>
<tr>
<th>Variable</th>
<th>Woman (n=30)</th>
<th>Men (n=10)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>32.8 ± 9.5</td>
<td>31.4 ± 5.8</td>
</tr>
<tr>
<td>Education level</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-University degree</td>
<td>16 (53%)</td>
<td>4 (40%)</td>
</tr>
<tr>
<td>University degree</td>
<td>14 (47%)</td>
<td>6 (60%)</td>
</tr>
<tr>
<td>Reproductive status</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Childless</td>
<td>12 (40%)</td>
<td>5 (50%)</td>
</tr>
<tr>
<td>Fertile a</td>
<td>8 (27%)</td>
<td>4 (40%)</td>
</tr>
<tr>
<td>Infertile b</td>
<td>10 (33%)</td>
<td>1 (10%)</td>
</tr>
</tbody>
</table>

Data are presented as means ± standard deviation or % (n).

a pregnant, given birth, fathered child (spontaneous conception)

b ≤ 34 year old and try to conceive for ≥ 12 month or ≥ 34 year old and try to conceive for ≥ 6 month and/or history of medical consultation for fertility problems or
APPENDIX

Échelle de Cardiff des connaissances sur la fertilité

Instructions : Voici quelques énoncés concernant la fertilité. Veuillez indiquer si vous croyez que les énoncés sont vrais ou faux en cochant la case appropriée. Si vous ne connaissez pas la réponse, veuillez cocher « je ne sais pas ».

(i) Une femme est moins fertile après l’âge de 36 ans. □ vrai □ faux □ je ne sais pas
(ii) Un couple est considéré comme infertile s’il a eu des relations sexuelles régulières (sans utilisation de contraceptif) pendant un an et que la femme n’arrive pas à tomber enceinte. □ vrai □ faux □ je ne sais pas
(iii) Fumer diminue la fertilité féminine. □ vrai □ faux □ je ne sais pas
(iv) Fumer diminue la fertilité masculine. □ vrai □ faux □ je ne sais pas
(v) Environ un couple sur dix est infertile. □ vrai □ faux □ je ne sais pas
(vi) Si un homme produit du sperme, alors il est fertile. □ vrai □ faux □ je ne sais pas
(vii) De nos jours, une femme dans la quarantaine a autant de chance de tomber enceinte qu’une femme dans la trentaine. □ vrai □ faux □ je ne sais pas
(viii) Avoir de saines habitudes de vie vous rend fertile. □ vrai □ faux □ je ne sais pas
(ix) Si un homme a eu les oreillons après la puberté, il est plus susceptible d’avoir plus tard un problème de fertilité. □ vrai □ faux □ je ne sais pas
(x) Une femme qui n’a pas ses menstruations est quand même fertile. □ vrai □ faux □ je ne sais pas
(xi) Si une femme a un surpoids de plus de 13 kilos (28 livres), elle pourrait ne pas être capable de tomber enceinte. □ vrai □ faux □ je ne sais pas
(xii) Si un homme peut avoir une érection, c’est un signe de fertilité. □ vrai □ faux □ je ne sais pas
(xiii) Les personnes qui ont eu une maladie sexuellement transmissible sont susceptibles de souffrir d’une baisse de fertilité. □ vrai □ faux □ je ne sais pas
Si vous planifiez avoir des enfants, vous devez commencer à prendre soin de votre corps dès maintenant. Calculez votre score FertiSTAT et découvrez ce que vous pouvez faire pour votre fertilité. Vous pouvez calculer votre score FertiSTAT, que vous essayiez ou non de tomber enceinte.

**Si vous n’essayez pas de tomber enceinte à l’heure actuelle**, à la section « Vos tentatives pour tomber enceinte », choisissez votre groupe d’âge en considérant que vous essayez depuis moins de 6 mois (1er ou 2e choix de la section).

1.  **Cochez toutes les cases de couleur qui s’appliquent à vous.**

<table>
<thead>
<tr>
<th>Vos tentatives pour tomber enceinte</th>
<th>Vos antécédents de reproduction</th>
<th>Vos habitudes de vie</th>
</tr>
</thead>
<tbody>
<tr>
<td>☐ J’ai plus de 34 ans et j’essaie de tomber enceinte depuis 6 mois ou moins.</td>
<td>☐ J’ai subi une chirurgie pelvienne.</td>
<td>☐ Je n’arrive pas à gérer le stress que je ressens actuellement.</td>
</tr>
<tr>
<td>☐ J’ai plus de 34 ans et j’essaie de tomber enceinte depuis 6 mois ou plus.</td>
<td>☐ J’ai des relations sexuelles non protégées avec de multiples partenaires.</td>
<td>☐ Je prends actuellement des stéroïdes anabolisants (à des fins non médicales).</td>
</tr>
<tr>
<td>☐ J’essaie de tomber enceinte depuis plus de 12 mois (peu importe mon âge).</td>
<td>☐ J’ai consommé des drogues dures dans le passé (par ex. héroïne, cocaine, ecstasy).</td>
<td>☐ Mon cycle menstruel est imprévisible. Mes règles surviennent souvent plus de 5 jours plus tôt ou plus tard que prévu (lorsque je n’utilise pas de contraceptif).</td>
</tr>
</tbody>
</table>

**Pour tenir compte du profil de fertilité de votre partenaire masculin :**
- Cochez pour lui les cases de la section sur les habitudes de vie (sauf celle sur le poids);
- Suivez les conseils pour ces facteurs.

Si votre partenaire souffre (ou a déjà souffert) de cryptorchidie [testicule(s) non descendu(s)] ou s’il a eu les oreillons après la puberté, il devra consulter un médecin pour un examen plus approfondi de sa situation lorsque vous essaierez de tomber enceinte de lui.
2. **Que signifie votre score FertiSTAT ?**

Pour chaque catégorie de couleur, comptez le nombre de cases que vous avez cochées et encerclez ce nombre dans chacun des thermomètres de couleur ci-dessous pour connaître les mesures que vous devez prendre. Plus le nombre de cases de couleur jaune, orange et rouge est élevé, plus il sera important que vous preniez des mesures si vous essayez de tomber enceinte.

**Bleu**
- J’ai n’ai coché que des cases bleues.
- Vous n’avez coché aucun de nos facteurs de risque. Toutefois, continuez de surveiller votre fertilité avec FertiSTAT parce que votre situation pourrait changer et que la fertilité féminine diminue après l’âge de 34 ans.

**Jaune**
- J’ai coché une ou plusieurs cases jaunes.
- Vous devriez songer à changer vos habitudes de vie. Tous ces facteurs ont une incidence sur votre fertilité, que vous essayiez ou non de tomber enceinte.
- Si vous n’essayez pas de tomber enceinte, vous devez savoir que la fertilité féminine diminue après l’âge de 34 ans.

**Orange**
- J’ai coché une ou plusieurs cases orange.
- Ces facteurs peuvent être importants pour votre fertilité. Songez à consulter un médecin si vous essayez de tomber enceinte. Ce dernier pourrait vous conseiller et vous recommander des mesures à prendre, au besoin.
- Si vous n’essayez pas de tomber enceinte, vous devez savoir que la fertilité féminine diminue après l’âge de 34 ans.

**Rouge**
- J’ai coché une ou plusieurs cases rouges.
- Si vous essayez de tomber enceinte, vous devez consulter votre médecin pour un examen plus approfondi de votre situation. L’usage de drogues et de stéroïdes anabolisants à des fins non médicales diminue la fertilité et vous devriez songer à changer ces habitudes.
- Si vous n’essayez pas de tomber enceinte, vous devez savoir que la fertilité féminine diminue après l’âge de 34 ans.