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"Buying into thoughts": French Validation of the Cognitive Fusion Questionnaire »

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Abstract

This research reports the psychometric properties of a French version of the Cognitive Fusion Questionnaire (CFQ). Cognitive fusion is one of the central concepts of Acceptance and Commitment Therapy (ACT), a form of cognitive and behavioural therapy (CBT). Cognitive fusion is defined as the excessive dominance of verbal or cognitive events on behavior, relative to other sources of behavioural influence. Cognitive fusion is characterized by entanglement in thinking, taking thoughts literally and viewing them as highly believable or factually accurate. Despite the relevance of cognitive fusion, very few instruments are available for the clinician and researcher, and none are yet available in French. Hence, the purpose of this paper is to translate and validate the CFQ among different samples of French-speaking individuals. Results across three samples (e.g. 2 undergraduate samples, one chronic pain sample from the community) show good support of the CFQ's factor structure, internal consistency, as well as concurrent and convergent validity. The results are discussed in terms of the potential uses of the CFQ for research and clinical purposes.

Keywords: Cognitive Fusion Questionnaire, Acceptance and Commitment Therapy, Cognitive-Behavioural Therapy, Transcultural Validation, CFQ.

Résumé

Cette étude rapporte les propriétés psychométriques d'une version française du Questionnaire de fusion cognitive (*Cognitive Fusion Questionnaire*; CFQ). La fusion cognitive

est l'un des concepts centraux de la thérapie d'acceptation et d'engagement (Acceptance and Commitment Therapy; ACT), une forme de thérapie cognitive et comportementale (TCC). La fusion cognitive se définit comme la domination excessive des événements verbaux ou cognitifs sur le comportement, en comparaison à d'autres sources d'influence comportementale. Elle est caractérisée par un enchevêtrement dans les pensées, par le fait de prendre ses pensées à la lettre ou pour une vérité. Malgré la pertinence du concept de fusion cognitive, très peu d'instruments sont disponibles pour le clinicien et le chercheur, et aucun encore en français. Ainsi, le but de cette étude est de traduire et valider le CFQ (Gillanders et al., 2014) au sein de différents échantillons d'individus francophones. Les résultats auprès de trois échantillons (deux échantillons universitaires et un échantillon d'adultes souffrant de douleur chronique dans la communauté) démontrent de bons indices quant à la structure factorielle du CFQ, la cohérence interne, ainsi que les validités concurrente et convergente. Les résultats sont discutés en termes des potentielles utilisations du CFQ en clinique et en recherche.

Mot clés : Thérapie d'acceptation et d'engagement (ACT), Thérapie cognitive et comportementale, Questionnaire de fusion cognitive, validation transculturelle, CFQ.

"Buying into Thoughts": Validation of a French Translation of the Cognitive Fusion Questionnaire

Acceptance and Commitment Therapy (ACT; Hayes, Strosahl, & Wilson, 2012) is part of the contemporary Cognitive and Behavioural Therapies (CBT) that use acceptance and mindfulness methods to promote behavioural change (Hayes, Villatte, Levin, & Hildebrant, 2011). In the recent years, ACT has gained much attention and has become well disseminated. ACT is considered a well-established treatment for chronic pain, and has shown moderate support in efficacy for the treatment of depression, mixed anxiety, substance abuse, and psychotic disorders. ACT has also been shown to be similarly effective to traditional CBT (A-Tjak, Davis, Morina, Powers, Smits, Emmelkamp, 2015; Öst, 2014; Ruiz, 2010). The conceptual framework of ACT has developed in parallel with a basic science account called Relational Frame Theory (RFT; Hayes, Barnes-Holmes, Roche, 2001), a broad behavior analytic research program that provides a comprehensive psychological account of language and higher cognition, and their influence on behaviours. One of the central concepts of ACT is Cognitive Fusion (CF).

From an ACT and RFT perspective, CF occurs when contextual cues signal that we are in a context of literality (Blackledge, 2007). In such contexts, thoughts are highly believable and dominate our awareness. Their behavioural influence is markedly increased in such contexts. According to ACT, CF is very often associated with suffering. In a fused state, the person cannot distinguish awareness from cognitive narratives because each thought and its referents are so tightly bound together (Hayes et al., 2012). For example, a client with social anxiety who is scheduled to give a presentation in a few weeks becomes increasingly terrified while having fleeting images of being ridiculed in front of the audience, despite the fact that the event is in the future and not present in the here and now. Humans have the ability to derive stimulus functions

hence, even though there is no imminent danger, the thought itself acquires the stimulus function of the event and can evoke the same reaction as if the situation was occurring in that moment (Hayes et al., 2012).

The conceptual framework of ACT suggests that the behavioural influence of cognitive events is controlled by contextual cues that signal whether or not the individual is in a context in which thoughts should be taken seriously. By contrast, therapists can use language, metaphors, modeling, experiential exercises, and physical gestures to create a context (in therapy) in which cognitive events alter their functions, without needing to alter their form. By creating such a context, in which multiple contextual cues signal to the client that thinking does not need to be responded to or controlled, the stimulus functions of cognitive events are altered and the client learns how to behave in more adaptive ways even when self-limiting thoughts are present. This process is the opposite of CF and is referred to as 'defusion'. Despite the conceptual centrality of CF (and defusion) in ACT, there is no agreed measure to assess CF.

Recently, a self-reported measure, the Cognitive Fusion Questionnaire (CFQ; Gillanders et al., 2014), has been developed to assess the extent to which an individual tends to fuse with his or her thoughts. The CFQ has undergone a rigorous series of studies that showed good support of its validity and reliability. Considering CFQ's psychometric properties and its versatility (Gillanders et al., 2014; McCracken, DaSilva, Skillicorn, & Doherty, 2014), we chose to validate the CFQ in French. The results of Gillanders and colleagues' (2014) studies involving over 1,800 participants across seven different samples showed good preliminary psychometric properties of the 7-item CFQ. Indeed, confirmatory factor analysis across five of those samples showed overall acceptable fit of the hypothesized one-factor structure. The reliability of the instrument was evaluated based on its internal consistency ($\alpha = .91$), and temporal stability tested in a 4-

week follow up study (r = .81). Construct validity and divergent validity were assessed by analyzing correlations with other variables that were hypothesized to be theoretically related to CF for the former, and theoretically different for the latter. The authors concluded that the CFQ has good construct validity and preliminary evidence of the CFQ's divergent validity was established (Gillanders et al., 2014).

Work on the CFQ have been mostly done in the field of chronic pain, where a growing number of studies have provided empirical support for the use of ACT-based interventions in the treatment of chronic pain (Hann & McCracken, 2014). In fact, the psychological flexibility model of ACT can be seen as a basis for integration and progress in psychological approaches to pain (McCracken & Morley, 2014). McCracken, DaSilva et al. (2014) further validated the CFQ (13-items) with a sample of 326 adults who suffer from chronic pain. Both the 13-item and the 7-item revealed good internal consistency. Moreover, the authors found medium-sized correlations between the CFQ and measures of social functioning, vitality, and general health, and large-sized correlations with measures of depression and mental health. In regression analyses, the CFQ was a significant predictor for five of the six measures of patient emotional and social functioning and health, failing only in predicting physical functioning (McCracken, DaSilva et al., 2014).

Given the promising results shown by the English version of the CFQ as a measure of CF, the purpose of the current study was to validate the 7-item CFQ (Gillanders et al., 2014) in French speaking populations. First, replication analyses of Exploratory Factor Analyses (EFA) were performed to explore the factor structure in three different samples. Second, concurrent and convergent validity were tested to further evaluate the psychometric properties of the CFQ French version and its relation to other established instruments.

Method

Participants and procedure

Three different samples were used in the current study. The first sample (sample 1) was comprised of 282 university students from the Université du Québec à Trois-Rivières (UQTR), ages 18-42 (*M* = 24.24, *SD* = 8.90), and from which 73.5% were female. Participants were recruited directly in their classrooms, where they were informed of the purpose of the study. No compensation was offered for participating. The second sample (sample 2) consisted of 394 university students, ages 18-63 (M = 24.95, *SD* = 6.02), 82.7% were female; 62.8% were undergraduate students and the majority (66.6%) studied at UQTR. Participants were recruited via online advertisements on social media (e.g., Facebook), inviting them to complete an online survey. Prior to the study, participants were informed that as a potential reward for participation, six MASTERCARD© gift certificates worth 25$ would be drawn one month after the survey was completed. The third sample (sample 3) was comprised of 564 adults from the community who suffer from chronic pain. We chose a chronic pain population firstly because individuals who suffer from chronic pain tend to demonstrate higher levels of negative thoughts (Williams, Keefe, & Vlaeyen, 2010) and as previously mentioned, ACT-based interventions are well established in the treatment of chronic pain (Hann & McCracken, 2014). The mean age for the chronic pain sample was 51.74 (*SD* = 12.25), and 79.6% were female. The majority identified as being from a white ethnic group (98.6%), and 61% reported chronic pain for more than seven years. Prior to the study, participants were informed that ten MASTERCARD© gift certificates worth 40$ would be drawn. The surveys for all samples were administered online between November 2013 and February 2015. They included personal information (socio-demographic data) and different questionnaires assessing psychological flexibility and psychological distress.

Instruments

The development and validation process of the Cognitive Fusion Questionnaire original version is described in Gillanders et al. (2014). The final scale consists of 7 items answered on a 7 point Likert scale from 1 = *never true* to 7 = *always true*. Examples of items are ‘‘I get so caught up in my thoughts that I am unable to do the things that I most want to do”, or ‘‘I struggle with my thoughts.’’ In the original study, responses were summed to create total scores. Scores range from 7 to 49, with higher scores corresponding to higher levels of CF. In the current study, however, the average response score was calculated (ranging from 1 to 7) to make the interpretation and the generalization easier for the reader. The CFQ was translated in French using a back translation method: initially translated into French by specialist researchers in the field of CBT, then back translated into English by a bilingual researcher. After reducing the minor discrepancies between the back translated and original versions, a final version was proposed (see Table 1).

The Acceptance and Action Questionnaire (AAQ-II; Bond et al., 2011; French version: Monestès, Villatte, Mouras, Loas, & Bond, 2009), is a 7-item measure of psychological inflexibility. Items are rated on a 7-point Likert scale ranging from 1 = *never true* to 7 = *always true*. An example of items is “I’m afraid of my feelings.” Unidimensionnality of the AAQ-II was assessed in every sample by means of Exploratory Factor Analysis (EFA) using Unweighted Least Square (ULS) as the extraction method, and Cattell’s scree plot (Cattell, 1966) and parallel analysis (Horn, 1960) to determine the number of factors to retain. In each sample, results indicated a clear one-factor solution with a minimum loading of .72 (sample 1), .71 (sample 2), and .77 (sample 3).

The Psychological Inflexibility in Pain Scale (PIPS; Wicksell et al., 2008; French version: Martel et al., 2015) is a 12-item questionnaire with two subscales: avoidance (8 items) and CF (4

items). Items are rated on a Likert-type scale ranging from 1 = *never true* to 7 = *always true*. An example of items is “It is not me that controls my life, it is my pain.” We assessed the unidimensionnality of both subscales using the same methodology as noted above. Results revealed unidimensionnality for the avoidance subscale (minimum loading of .66) and the CF subscale (minimum loading of .37).

The Mindful Attention Awareness Scale (MAAS; Brown & Ryan, 2003; French version: Jermann et al., 2009), is a 15-item questionnaire answered on a 6-point Likert scale ranging from 1 = *almost always* to 6 = *almost never*. An example of items is “I could be experiencing some emotion and not be conscious of it until some time later.” To assess the unidimensionnality of the MAAS, EFA analysis were performed in sample 1 and sample 2 using ULS as the extraction method. The scree plot and parallel analysis were used to determine the number of factors to retain. In sample 1 and sample 2, the scree plot and parallel analysis indicated a one-factor solution with minimum loadings of .36 (sample 1) and .34 (sample 2).

The Committed Action Questionnaire (CAQ-8; McCracken, Chilcot, & Norton, 2014; French version: Gagnon, Dionne, Balbinotti, & Monestès, 2016) is an 8-item questionnaire with two subscales: values persistence comprised of four positively phrased items (e.g., “I can remain committed to my goals even when there are times that I fail to reach them”) and effective behaviors comprised of four negatively phrased items (e.g., “I find it difficult to carry on with an activity unless I experience that it is successful”). Items are scored on a 7-point Likert type scale ranging from 0 = *never true* to 6 = *always true*. In sample 2 and sample 3, we assessed unidimensionnality of each subscales using EFA with ULS as the extraction method and the scree plot and parallel analysis for determining the number of factors to retain. In sample 2, results revealed the unidimensionnality for the two subscales with minimum loadings of .66

(positive subscale) and .50 (negative subscale). Similar results were found in sample 3 with minimum loadings of .78 (positive subscale) and .29 (negative subscale).

The Chronic Pain Acceptance Questionnaire (CPAQ-8; McCracken, Vowles, & Eccleston, 2004; French version: Scott, Bernier, Garland, & Sullivan, 2003). The CPAQ-8 assesses a person's acceptance of the experience of pain using two four-item subscales: activity engagement, which evaluates the degree to which behaviours are limited or restricted by pain, and pain willingness, which evaluates the degree or effort directed at controlling pain. Items are scored on a 7-point Likert scale ranging from 0 = *never true* to 6 = *always true*. An example of items is "I am getting on with the business of living no matter what my level of pain is." Scores for the pain willingness subscale must be reversed before calculating a total score. We assessed the unidimensionnality of the activity engagement subscale and the pain willingness subscale using the same methodology as noted above. Results from scree plot and parallel analysis revealed the unidimensionnality for the two subscales with minimum loadings of .63 (activity engagement) and .50 (pain willingness).

The Depression Anxiety Stress Scales (DASS-21; Lovibond & Lovibond, 1995; French version: Henry & Crawford, 2005), is a 21-item questionnaire comprised of three subscales: depression, anxiety, and stress. Items are rated on a 4-point Likert scale ranging from 0 = *did not apply to me at all* to 3 = *applied to me very much, or most of the time*. An example of items is "I couldn't seem to experience any positive feeling at all." We assessed the unidimensionnality of each subscale using EFA. The DASS-21 has a 4-point Likert scale and past research has shown that when there are less than 5 categories of responses, the Pearson correlations result in more biased estimates (e.g., Rhemtulla, Brosseau-Liard, & Savalei, 2012). In such cases, many authors advocate the use of the polychoric correlations matrix. Thus, we computed the polychoric

correlation matrix for each subscale with the software FACTOR 9 (Lorenzo-Seva & Ferrando, 2006); again using ULS as the extraction method and parallel analysis to determine the number of factors to retain. Parallel analysis revealed the unidimensionnality of the depression stress and anxiety subscales with minimum loadings of .57, .58, and .52, respectively.

The Hospital Anxiety Depression Scale (HADS; Zigmond & Snaith, 1983; French version: Bocéréan & Dupret, 2014). This 14-item questionnaire evaluates psychological distress according to two 7-item subscales measuring anxiety and depressive symptoms in non-psychiatric hospital contexts. Items are scored on a 4-point Likert scale ranging from 0 to 3. An example of items is "I feel tense or wound up." Similarly to the DASS-21, we computed the polychoric correlation matrix for each subscales with FACTOR 9 using ULS as the extraction method and parallel analysis to determine the number of factors to retain. Results revealed unidimensionnality for the anxiety subscale (minimum loading of .43) as well as for the depression subscale (minimum loading of .24).

The Pain Catastrophizing Scale (PCS; Sullivan, Bishop, & Pivik, 1995; French version: French et al., 2005). The PCS is comprised of 13 items assessing the presence and severity of catastrophic thoughts related to pain, and is divided in three subscales: rumination, magnification, and helplessness. Items are rated on a Likert scale from 0 = *not at all* to 4 = *all the time*; a higher score reflects a higher level of catastrophizing. An example of items is "I become afraid that the pain will get worse." Again, we computed the polychoric correlation matrix for each subscale with FACTOR 9 using ULS as the extraction method and parallel analysis to determine the number of factors to retain. Results revealed unidimensionnality for each subscales with minimum loadings of .77 (rumination), .74 (magnification), and .66 (helplessness).

The Brief Pain Inventory (BPI; Cleeland, 1994; French version: Poundja, Fikretoglu, Guay, & Brunet, 2007). This 10-item questionnaire evaluates the severity and interference of pain in daily activities. On a Likert scale ranging from 0 = *does not interfere* to 10 = *interferes completely*, participants are asked to rate the degree to which pain interfered with various activities in the past week (e.g., social activities, work, mood). A higher average score represents higher level of pain interference on daily function. The unidimensionnality of the BPI was assessed using factor analysis with ULS as the extraction method and the scree plot and parallel analysis for determining the number of factors to retain. Results from scree plot and parallel analysis revealed unidimensionnality of the BPI with a minimum loading of .56.

Missing data

Table 2 shows the means, standard deviations, skewness and kurtosis for each studied variable. In all samples, data were screened at the individual item level to confirm that each item had responses covering the full range of the response format, and that responses were normally distributed. The evaluation of the distribution revealed that the assumption of normality was satisfied as the distributions of all variables had indicators of skewness and kurtosis that were below |2.0| (Tabachnick & Fidell, 2001). Little's missing data analysis (Little, 1988) revealed that data were missing completely at random in every sample, and that missing data did not exceed 2%. Based on the low rate of missing data, a listwise deletion method was used. Some authors argue that in certain circumstances, listwise deletion yields parameter estimates as accurate as more modern approaches (Allison, 2002).

Results

Exploratory factor analysis

EFAs were performed using SPSS 20.0 in order to replicate the factorial structure of the CFQ found in the original study of Gillanders et al. (2014) in two different populations (university students and people suffering from chronic pain). As Osborne and Fitzpatrick (2012) argued, replication analysis of EFAs should be a prominent part of the analysis process while an instrument is at the exploratory stage of development. Evaluation of the distribution for each item of the CFQ revealed that responses deviate slightly from a normal distribution. Maximum Likelihood estimation method is known to result in more biased estimates in cases where the normality assumption is violated as opposed to other methods such as ULS that does not make distribution assumption (Gaskin & Happell, 2014). Thus, we decided to use ULS as the extraction method. Finally, to assess the number of factors to retain, Cattell's scree plot and parallel analysis were used.

Communalities and factor loadings for each sample are shown in Table 1. The Keiser-Meier-Olkin test of sampling adequacy (KMO) for samples 1, 2, and 3, was respectively: .92, .94, .92, thus, indicating a good degree of non-unique covariance amongst the set of items (Kaiser, 1974). Bartlett's test of sphericity was significant in each sample: sample 1 (X^2 = 1442.25, df = 21, $p < .05$); sample 2 (X^2 = 227.55, df = 21, $p < .05$); sample 3 (X^2 = 3426.23, df = 21, $p < .05$), indicating that all data sets were suitable for factor analysis. Based on the Kaiser greater-than-one rule, Cattell's scree plot and parallel analysis, in all three samples, the results indicated a clear one-factor structure. In sample 1, the first two eigenvalues were 4.93 (accounting for 65.7% of the total variance), and .55. In sample 2, the first two eigenvalues were 5.18 (accounting for 69.75% of the total variance), and .44. Finally, in sample 3, the first two eigenvalues were 5.13 (accounting for 68.85% of the variance), and .55.

Concurrent and Convergent Validity

To further assess the construct validity of the CFQ, correlation analyses were performed to ensure that CFQ correlates with theoretically expected outcomes (DASS-21, HADS; concurrent validity), that it is significantly related to similar constructs (AAQ-II, MAAS, CAQ-8, CPAQ, PCS, PIPS; convergent validity). All the analyses are based on the average score for each scale (see Table 2).

Regarding the concurrent validity, based on its relationship to emotional distress (Gillanders et al., 2014) as measured by the DASS-21 and the HADS, it was hypothesized that the CFQ would be strongly positively correlated with both of these measures. To determine the convergent validity, a strong positive correlation between the CFQ and experiential avoidance (or psychological inflexibility) as measured by the AAQ-II (Bond et al., 2011; Monestès et al., 2009) was hypothesized, based on previous studies (e.g., Gillanders et al., 2014, McCracken, DaSilva et al., 2014). Furthermore, a positive correlation between CFQ and Psychological Inflexibility (PIPS), was hypothesized, as both questionnaires measure parts of the inflexibility facets of the ACT model. Negative correlations were hypothesized between the CFQ and mindfulness (MAAS), committed action (CAQ-8), and pain acceptance (CPAQ-8). The PIPS, the MAAS, the CAQ-8, and the CPAQ-8 all reflect processes related to flexibility (vs inflexibility) within the ACT model, but yet are distinct to one another, thus moderate relations with the CFQ were hypothesized. Finally, considering that the PCS is a cognitive measure assessing the degree to which an individual magnifies his pain and ruminates about pain, a positive correlation between the CFQ and the PCS was hypothesized

Table 3 shows the results from correlational analyses across the three samples. As hypothesized, results from bivariate correlations revealed moderate and positive correlations between the CFQ and the three subscales of the DASS-21 (depression: $r(392) = .66$, $p < .05$;

anxiety: $r(392) = .52$, $p < .05$; stress: $r(392) = .58$, $p < .05$), as well as the HADS ($r(562) = .68$, $p < .05$), thus supporting the concurrent validity of the CFQ. Moreover, results showed a strong and positive correlation between the CFQ and the AAQ-II (ranging from $r = .78$ to $r = .81$), a moderate and positive correlation with the two subscales of the PIPS (avoidance: $r(562) = .50$, $p < .05$; fusion: $r(562) = .32$, $p < .05$), and the three subscales of the PCS (rumination: $r(562) = .59$, $p < .05$; magnification: $r(562) = .59$, $p < .05$; helplessness: $r(562) = .54$, $p < .05$). Negative and moderate correlations were found between the CFQ and the MAAS: $r(280) = -.48$, $p < .05$ and $r(392) = -.52$, $p < .05$; the two subscales of the CAQ-8 (values persistence: $r(392) = -.35$, $p < .05$; effective behaviors: $r(392) = -.53$, $p < .05$); and the two subscales of the CPAQ-8 (activity engagement: $r(562) = -.30$, $p < .05$; pain willingness: $r(562) = -.35$, $p < .05$), further supporting the convergent validity of the CFQ.

Discussion

This study sought to assess the psychometric properties of a French version of the CFQ. The CFQ showed excellent internal consistency across three different samples. Results from replication analyses of EFAs showed good psychometric properties, and confirmed the hypothesized one-factor structure of the instrument. Concurrent and convergent were also established. Overall, the results of the study support the use of the French CFQ for clinical and research purposes. The French CFQ constitutes a reliable and valid instrument.

The correlation found between the CFQ and the AAQ-II, (r ranging from .79 to .81) is strong, suggesting an overlap between the two measures. Similar results were also found in the studies of Gillanders et al. (2014) and McCracken et al. (2014). High correlations between the CFQ and the AAQ-II are not surprising since the two constructs partly measure psychological inflexibility. It is also possible that the overarching processes of psychological inflexibility are so

interdependent that the CFQ and the AAQ-II are measuring the same underlying construct. Gillanders et al. (2014) conducted an EFA between the two instruments to address this question. They found mixed results depending on the sample used. Indeed, in some of their samples, items from AAQ-II and CFQ loaded on their respective factor structure, whereas in other samples, some of the items were complex (i.e., loaded on both factorial structures). We conducted a similar analysis and have also found mixed results. McCracken et al. (2014) did the same and found that most of the items were clearly loading on one general factor. Consequently, further work is needed to clarify the relation between the CFQ and the AAQ-II. It might be possible that the CFQ is a stronger predictor of symptoms of distress than the AAQ-II in contexts where psychological inflexibility is assessed with regard to cognitions (Gillanders et al., 2014), whereas the AAQ-II is more related to affective measures. Both questionnaires may have their utility depending of the context in which they are used.

The process of cognitive defusion has received limited attention. The present findings are consistent with recent studies investigating CF or defusion in relation to psychological disorders and mental health. In this study, the CFQ was positively and significantly correlated with measures of emotional distress (stress, anxiety, and depressive symptoms).

The CFQ and the process it addresses could help future studies determine how to better target important processes in treatment. Defusion could be a key process related to outcome. Defusion is known to mediate the relation between improvement in quality of life or reduction of symptoms in various populations, such as individuals with psychotic disorders (Bach, Gaudiano, Hayes, & Herbert, 2013), depression (Zettle et al., 2011), and chronic pain (Wicksell, Olsson, & Hayes, 2011). Cognitive defusion represents an important source of therapeutic change across both traditional CBT and ACT (Arch, Wolitzky-Taylor, Eifert, & Craske, 2012).

The current study has some limitations that deserve to be acknowledged. First, the study had a cross-sectional design, which does not permit to establish cause and effect relations between CF and emotional distress or other constructs. In the future, prospective data is needed to verify the causal relationship between the level of CF and future emotional distress or disability. Testing CF over time would add incremental and predictive validity. Second, all of the study samples had a majority of female participants and two out of three samples were university students, thus limiting the generalizability of the results to other populations. Furthermore, no data concerning ethnicity were collected for samples 1 and 2. Although a chronic pain sample was used, further research is needed to test the French version of the CFQ in clinical populations. Third, the reliability of the HADS is questioned by some authors (Coyne & van Sonderen, 2012) for its lack of ability to uncover a reliable, generalizable underlying structure, not matching the anxiety and depression subscales, and its use needs to be targeted to more general measurement of distress (Cosco, Doyle, Ward, & McGee, 2012). It would be useful for future studies to include other measures of psychological distress. Fourth, test-retest reliability was not established in the current study.

In sum, the CFQ appears to be a reliable tool. While more research is still needed on CF, the French CFQ offers a useful tool for clinicians and researchers. The CFQ is a quick and easy instrument to administer that can be used among other questionnaires to assess the CF process of the ACT flexibility model at the beginning of a treatment. The CFQ can also be used to monitor the patient's level of CF session-by-session following an acceptance and mindfulness-based or CBT intervention. In the research context, the CFQ can be used as a process measure possibly mediating the effect of treatment, and can also be used in exploratory and model building cross-sectional studies, investigating the role of CF in comparison to other constructs in influencing

important outcomes across a wide range of conditions. Finally, the generic nature of the CFQ allows its use in investigations of ‘non-clinical’ phenomena such as therapist training, coaching, well-being and personal development.

References

Allison, P. D. (2002). *Missing data*. Thousand Oaks, CA: Sage Publications

Arch, J. J., Wolitzky-Taylor, K. B., Eifert, G. H., & Craske, M. G. (2012). Longitudinal treatment mediation of traditional cognitive behavioral therapy and acceptance and commitment therapy for anxiety disorders. *Behaviour Research and Therapy, 50*, 469-478.

A-Tjak, J. G, Davis, M. L., Morina, N., Powers, M. B., Smits, J. A, Emmelkamp, P. M. A. (2015). Meta-analysis of the efficacy of acceptance and commitment therapy for clinically relevant mental and physical health problems. *Psychotherapy Psychosomatic*, *84*(1), 30-6.

Bach, P., Gaudiano, B. A., Hayes, S. C., & Herbert, J. D. (2013). Acceptance and commitment therapy for psychosis: intent to treat, hospitalization outcome and mediation by believability. *Psychosis*, *5*(2), 166-174.

Bishop, S. R., Lau, M., Shapiro, S., Carlson, L., Anderson, N. D., Carmody, J., ... & Devins, G. (2004). Mindfulness: A proposed operational definition. *Clinical psychology: Science and Practice*, *11*(3), 230-241.

Blackledge, J. T. (2007). Disrupting verbal processes: Cognitive defusion in Acceptance and Commitment Therapy and other mindfulness-based psychotherapies. *The Psychological Record*, *57*(4), 555–576.

Bocéréan, C., & Dupret, E. (2014). A validation study of the Hospital Anxiety and Depression Scale (HADS) in a large sample of French employees, *BMC Psychiatry*, *14*, 354.

Bond, F. W., Hayes, S. C., Baer, R. A., Carpenter, K. M., Guenole, N., Orcutt, H. K., ... & Zettle, R. D. (2011). Preliminary psychometric properties of the Acceptance and Action Questionnaire–II: A revised measure of psychological inflexibility and experiential avoidance. *Behavior Therapy*, *42*(4), 676-688.

Brown, K. W., & Ryan, R. M. (2003). The benefits of being present: mindfulness and its role in psychological well-being. *Journal of Personality and Social Psychology*, *84*(4), 822.

Cattell, R. B. (1966). The scree test for the number of factors. *Multivariate Behavioral Research, 1*(2), 245-276.

Cleeland, C. S., Ryan, K. M. (1994). Pain assessment: global use of the Brief Pain Inventory. *Annals Academy Medicine Singapore*, *23*(2), 129-138.

Cohen, J. (1988). *Statistical power analysis for the behavioural sciences*. Hillsdale, NJ: Erlbaum.

Cohen, J. (1992). A power primer. *Psychological Bulletin*, *112*(1), 155–159.

Coyne, J. C., & van Sonderen, E. (2012). No further research needed: abandoning the Hospital and Anxiety Depression Scale (HADS). *Journal of Psychosomatic Research*, 72(3), 173-174.

Cosco, T. D., Doyle F., Ward, M., McGee H. (2012). Latent structure of the Hospital Anxiety and Depression Scale: A 10-year systematic review. *Journal of Psychosomatic Research*, *72*(3):180–184.

French, D. J., Noel, M., Vigneau, F., French, J. A., Cyr, C. P., & Evans, R. T. (2005). Scale of dramatization vis-a-vis PCS-CF pain-Canadian adaptation in French language in the" Pain Catastrophizing Scale". *Canadian Journal of Behavioural Science-Revue canadienne des sciences du comportement*, *37*(3), 181-192.

Gagnon, J., Dionne, F., Balbinotti, M., & Monèstes, J-L. (2016). Factorial Structure of the French Committed Action Questionnaire (CAQ-8) in a Chronic Pain and University Student Populations. Manuscript submitted for publication.

Gaskin, C. J., & Happell, B. (2014). On exploratory factor analysis: A review of recent evidence, an assessment of current practice, and recommendations for future use. *International journal of nursing studies*, *51*(3), 511-521.

Gillanders, D. T., Bolderston, H., Bond, F. W., Dempster, M., Flaxman, P. E., Campbell, L., . . . & Ferenbach, C. (2014). The development and initial validation of the Cognitive Fusion Questionnaire. *Behavior Therapy, 45*(1), 83-101.

Hann, K. E. et McCracken, L. M. A. (2014). Systematic review of randomized controlled trials of Acceptance and Commitment Therapy for adults with chronic pain: Outcome domains, design quality, and efficacy. *Journal of Contextual and Behavioral Science*, *3*(4), 217–227.

Hayes, S. C., Barnes-Holmes, D., & Roche, B. (2001). *Relational frame theory: A post-skinnerian account of human language and cognition*. New York, NY: Plenum Press.

Hayes, S. C., Strosahl, K. D., & Wilson, K. G. (2012). *Acceptance and commitment therapy: The process and practice of mindful change* (2nd ed.). New York, NY: Guilford Press.

Hayes, S. C., Villatte, M., Levin, M., & Hildebrandt, M. (2011). Open, aware, and active: contextual approaches as an emerging trend in the behavioral and cognitive therapies. *Annual Review of Clinical Psychology*, *7*, 141-168.

Henry, J. D., & Crawford, J. R. (2005). The 21-item version of the Depression Anxiety Stress Scales (DASS–21): Normative data and psychometric evaluation in a large non-clinical sample. *British Journal of Clinical Psychology*, *44*, 227-239.

Horn, J. L. (1965). A rationale and test for the number of factors in factor analysis. *Psychometrika, 30*, 179-185.

Jermann, F., Billieux, J., Larøi, F., d'Argembeau, A., Bondolfi, G., Zermatten, A., & Van der Linden, M. (2009). Mindful Attention Awareness Scale (MAAS): Psychometric properties of the French translation and exploration of its relations with emotion regulation strategies. *Psychological Assessment*, *21*(4), 506.

Kaiser, H. F. (1974). An index of factorial simplicity, *Psychometrika*, *39*(1), 31-36.

Little, R. J. (1988). A test of missing completely at random for multivariate data with missing values. *Journal of the American Statistical Association*,*83*(404), 1198-1202.

Lorenzo-Seva, U., & Ferrando, P. J. (2006). FACTOR: A computer program to fit the exploratory factor analysis model. *Behavior Research Methods*, *38*(1), 88-91.

Lovibond, S. H. & Lovibond, P. F. (1995). *Manual for the Depression Anxiety Stress Scales*. (2nd Ed.) Sydney: Psychology Foundation.

Martel, M-E., Dionne, F., Gauchet, A., Zouikri-Roland, Y., Decker, E., Trouillet, R., Wicksell, R., & Monestès, J-L. (2015). Psychological Inflexibility for Pain: Translation and Validation for a French-Speaking Population. *ACBS Annual World Conf*erence, Berlin (Germany).

McCracken, L. & Morley, S. (2014). The psychological flexibility model: A basis for integration and progress in psychological approaches to chronic pain management. *The Journal of Pain*, *15*(3), 221–234.

McCracken, L. M., Chilcot, J., & Norton, S. (2014). Further development in the assessment of psychological flexibility: A shortened Committed Action Questionnaire (CAQ-8). *European Journal of Pain, 19*(5), 677-685.

McCracken, L. M., DaSilva, P., Skillicorn, B., & Doherty, R. (2014). The Cognitive Fusion Questionnaire: A preliminary study of psychometric properties and prediction of functioning in chronic pain. *The Clinical Journal of Pain*, *30*(10), 894-901.

McCracken, L. M., Vowles, K. E., & Eccleston, C. (2004). Acceptance of chronic pain: Component analysis and a revised assessment method. *Pain, 107*(1-2), 159-166.

Monestès, J-L., Villatte, M., Mouras, H., Loas, G., & Bond, F. W. (2009). Traduction et validation française du questionnaire d'acceptation et d'action (AAQ-II). *Revue Européenne de Psychologie Appliquée/European Review of Applied Psychology*, *59*(4), 301-308.

Osborne, J., & Fitzpatrick, D. (2012). Replication analysis in exploratory factor analysis: What it is and why it makes your analysis better. *Practical Assessment Research & Evaluation*, *17*(15),1-8.

Öst, L.-G. (2014). The efficacy of Acceptance and Commitment Therapy: An updated systematic review and meta-analysis. *Behaviour Research and Therapy*, *61*, 105-121.

Poundja, S., D. Fikretoglu, D. Guay, S., & Brunet, A. (2007). Validation of the French Version of the Brief Pain Inventory in Canadian veterans Suffering from Traumatic Stress. *Journal of Pain and Symptom Management*, *33*, 720-726.

Rhemtulla, M., Brosseau-Liard, P. É., & Savalei, V. (2012). When can categorical variables be treated as continuous? A comparison of robust continuous and categorical SEM estimation methods under suboptimal conditions. *Psychological Methods, 17*(3), 354.

Ruiz, F. J. (2010). A review of acceptance and commitment therapy (act) empirical evidence: Correlational, experimental psychopathology, component and outcome studies. *International Journal of Psychology and Psychological Therapy, 10*(1), 125-162.

Scott, W., Bernier, E., Garland, R., & Sullivan, M. J. L. (2013). Preliminary validation of a French version of the Chronic Pain Acceptance Questionnaire. *Annual Meeting of the Canadian Pain Society*, Winnipeg (Canada).

Sullivan, M. J. L., Bishop, S., Pivik, J. (1995). The Pain Catastrophizing Scale: Development and validation. *Psychological Assessment, 7*, 524-532. doi: 10.1037/1040-3590.7.4.524

Tabachnick, B. G., & Fidell, L. S. (2001). *Using multivariate analysis.* California State University Northridge: Harper Collins College Publishers.

Teasdale, J. D., Moore, R. G., Hayhurst, H., Pope, M., Williams, S., & Segal, Z. V. (2002). Metacognitive awareness and prevention of relapse in depression: empirical evidence. *Journal of Consulting and Clinical Psychology*, 70(2), 275.

Wicksell, R. K., Renöfält, J., Olsson, G. L., Bond, F. W., & Melin, L. (2008). Avoidance and cognitive fusion–central components in pain related disability? Development and preliminary validation of the Psychological Inflexibility in Pain Scale (PIPS). *European Journal of Pain*, *12*(4), 491-500.

Wicksell, R. K., Olsson, G. L., & Hayes, S. C. (2011). Mediators of change in Acceptance and Commitment Therapy for pediatric chronic pain. *Pain, 152*(12), 2792-2801.

Williams, A., Keefe, F. J., & Vlaeyen, J. W. S. (2010). Psychology for non-psychologists. In J. Mogil (dir.), *Pain 2010 - an updated review: refresher course syllabus* (pp. 161-178): IASP Press: Seatle, USA.

Zettle, R. D., Rains, J. C., & Hayes, S. C. (2011). Processes of change in acceptance and commitment therapy and cognitive therapy for depression: A mediation reanalysis of Zettle and Rains. *Behavior Modification*, *35*(3), 265-283.

Zigmond, A. S. & Snaith, R. P. (1983). The Hospital Anxiety and Depression. Scale. *Acta Psychiatrica Scandinavica*, *7*, 361-370.

Table 1

Initial Exploratory Factor Analysis Factor Loadings, Communalities and Cronbach's Alpha of the CFQ in two University Student Populations and a Chronic Pain Population

	Factor loadings			Communalities		
	Sample			Sample		
Items	1	2	3	1	2	3
1. Mes pensées me font souffrir ou me rendent tristes. (My thoughts cause me distress or emotional pain)	.76	.88	.90	.58	.62	.62
2. Je suis tellement pris par mes pensées que je suis incapable de faire les choses que je veux vraiment faire. (I get so caught up in my thoughts that I am unable to do the things that I most want to do)	.78	.86	.85	.60	.65	.67
3. J'analyse trop les situations au point que cela devient inutile pour moi. (I over-analyse situations to the point where it's unhelpful to me)	.68	.87	.83	.46	.61	.63
4. Je lutte contre mes pensées. (I struggle with my thoughts)	.85	.85	.82	.72	.77	.68
5. Je m'agace moi-même d'avoir certaines pensées. (I get upset with myself for having certain thoughts)	.88	.80	.82	.78	.76	.70
6. J'ai tendance à être très pris par mes pensées. (I tend to get very entangled in my thoughts)	.86	.79	.80	.74	.72	.81
7. Je dois lutter énormément pour laisser tomber mes pensées désagréables, même si je sais bien que cela m'aiderait. (It's such a struggle to let go of upsetting thoughts even when I know that letting go would be helpful)	.84	.78	.79	.71	.79	.72

Note. Sample 1: University Student sample, $N = 282$; Sample 2: University Student sample, $N = 394$; Sample 3: Chronic Pain sample, $N = 564$.

Table 2

Descriptive Statistics of all the Study Variables for each Sample

	Cronbach's alpha	*M*	*SD*	*Skewness*	*Kurtosis*
CFQ					
Sample 1	.93	3.2	1.4	.32	-.73
Sample 2	.94	3.6	1.4	-.11	-.55
Sample 3	.94	3.7	1.4	-.08	-.64
DASS-21					
Sample 2					
Depression subscale	.84	.63	.59	.53	-.13
Anxiety subscale	.83	.59	.56	1.02	.62
Stress subscale	.84	1.2	.63	1.44	2.19
HADS					
Sample 3	.86	1.2	.51	.08	-.41
PCS					
Sample 3					
Rumination subscale	.90	2.2	1.1	-.22	-.82
Magnification subscale	.82	1.7	.99	.20	-.75
Helplessness subscale	.91	2.2	.94	-.20	-.65
AAQ-II					
Sample 1	.91	3.9	1.3	.68	-.03
Sample 2	.92	2.9	1.3	.53	-.25
Sample 3	.95	3.6	1.5	.18	-.72
PIPS					
Sample 3					
Avoidance subscale	.92	4.7	1.1	-.22	-.29
Fusion subscale	.69	5.7	.96	-.70	.63
MAAS					
Sample 1	.86	3.9	.72	-.08	-.39
Sample 2	.90	3.8	.86	-.24	-.29

CAQ-8					
Sample 2					
Values Persistence	.84	4.5	.88	-.26	-.53
Effective Behaviors	.72	3.7	.92	-.11	.27
Sample 3	.90	4.7	1.2	-.30	.05
Values Persistence	.63	2.6	1.1	.49	.18
Effective Behaviors					
CPAQ-8					
Sample 3					
Activity engagement subscale	.81	3.5	1.3	-.28	-.46
Pain willingness subscale	.71	1.8	1.0	.35	.11
BPI					
Sample 3	.91	5.5	2.1	-.25	-.44
Average pain in the last week					
Sample 3		5.9	1.5	-.12	.40

Note. Sample 1: University Student sample, $N = 282$; Sample 2: University Student sample, $N = 394$; Sample 3: Chronic Pain sample, $N = 564$. CFQ = Cognitive Fusion Questionnaire; DASS-21 = Depression Anxiety Stress Scale; HADS = Hospital Anxiety and Depression Scale; PCS = Pain Catastrophizing Scale; AAQ-II = Acceptance and Action Questionnaire; PIPS = Psychological Inflexibility in Pain Scale; MAAS = Mindful Attention Awareness Scale; CAQ-8 = Committed Action Questionnaire; CPAQ-8 = Chronic Pain Acceptance Questionnaire. BPI = Brief Pain Inventory. All the means and standard deviations are based on the average scores for each questionnaire.

Table 3

Correlations Between CFQ and Others Constructs

Measure	*N*	*r*	[95% CI]
DASS-21			
Sample 2	394		
Depression subscale		.60*	[.54 - .65]
Anxiety subscale		.52*	[.45 - .59]
Stress subscale		.58*	[.51 - .64]
HADS			
Sample 3	564	.68*	[.63 - .72]
PCS			
Sample 3	564		
Rumination subscale		.59*	[.53 - .64]
Magnification subscale		.59*	[.54 - .64]
Helplessness subscale		.54*	[.48 - .61]
AAQ-II			
Sample 1	282	.81*	[.76 - .85]
Sample 2	394	.78*	[.74 - .82]
Sample 3	564	.79*	[.74 - .82]
PIPS			
Sample 3	564		
Avoidance subscale		.50*	[.44 - .56]
Fusion subscale		.32*	[.23 - .39]
MAAS			
Sample 1	282	-.48*	[-.57 - -.39]
Sample 2	394	-.52*	[-.60 - -.41]
CAQ-8			
Sample 2	394		
Values Persistence		-.35*	[-.44 - -.25]
Effective Behaviors		.53*	[.43 - .61]
Sample 3	564		
Values Persistence		-.45*	[-.52 - -.38]
Effective Behaviors		.55*	[.48 - .62]

CPAQ-8			
Sample 3	564		[-.38 - -.21]
Activity engagement subscale		-.30*	[-.43 - -.27]
Pain willingness subscale		-.35*	

Note. Samples: 1 and 2 = University Student samples, 3 = Chronic Pain sample. DASS-21 = Depression Anxiety Stress Scale; HADS = Hospital Anxiety and Depression Scale; PCS = Pain Catastrophizing Scale; AAQ-II = Acceptance and Action Questionnaire; PIPS = Psychological Inflexibility in Pain Scale; MAAS = Mindful Attention Awareness Scale; CAQ-8 = Committed Action Questionnaire; CPAQ-8 = Chronic Pain Acceptance Questionnaire; CI = Confidence Interval based on 1000 bootstrapping.