

# In search of content validity: facet analysis as a qualitative method to improve questionnaire design

## An application in health research

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**Abstract** In this paper, two scales are examined for the measurement of self-regulation. The item content is evaluated for its specific usefulness for measuring self-regulation of obesity patients. Qualitative facet analysis (QFA), an application of Guttman's Facet Theory, is used to investigate whether item content sufficiently covers the intended content area. This form of content analysis constitutes a systematic, effective and critical tool for improving the content validity of questionnaires. It discovers topics that are underrepresented or overrepresented. The method offers a way to clarify the relationship between concrete item phrases and the desired content as defined by construct and theory. It allows the researcher to improve his or her understanding of the items as a stimulus and of the similarities of items, and allows the formulation of a possible structure for confirmative factor analysis. Various ways to improve the content of both scales are identified.

**Keywords** Content validity · Facet analysis · Qualitative method · Questionnaire design · Health research · Obesitas

## 1 Introduction

When applied researchers develop a questionnaire for a specific and practical goal, such as measuring self-regulation of obesity patients, the construct in question is often complex in nature. The psychometric qualities of the questionnaire can be uncertain, and in that case unsatisfactory results may be the result of problems with the content of the questionnaires. The approach we wish to propose is to give the content of items a more prominent place, and to use a systematic approach to represent the content and to facilitate the formulation of new or additional items.

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Qualitative facet analysis (QFA) is a specific and practical application of the Facet Theory developed by Guttman (Levy 1994). Guttman's methods are used in several fields of research and have led to many and various applications. Cohen (2004) has published an extensive bibliography for the period from 1941 to 2003, and found no less than 337 articles in 30 journals and 358 articles or chapters in books. Facet Theory provides a general system of concepts, definitions and theorems on both design methodology and data analysis (Borg and Shye 1995). Facet Theory links the properties of the definitional system with the observations made within a given design.

In our application of Facet Theory we use its basic concepts primarily for the description of the content of items in more abstract terms, so that similarities and dissimilarities of these stimuli become more apparent. This analysis shows which content is covered by the questions and which content is lacking. It offers a basis to clarify the relationship between similar item content and similarities between answers. Content validity of a questionnaire can be established by showing that the test items are a sample of a universe in which the investigator is interested. Content validity is to be established deductively, by defining a universe of items and sampling systematically within this universe to establish the test (Cronbach and Meehl 1955). This approach assumes that a detailed description of the content domain is available. In practice, it is a reciprocal process, where the determination of the content and the analysis of the answers take turns.

In this paper, we examine two questionnaires that have been used in health research. Both instruments illustrate the complexity of the concepts that are used in applied research. The first instrument is the Illness Perception Questionnaire (IPQ) constructed by Weinman et al. (1996) for the measurement of illness perception in the context of self-regulation and coping, and is based on the theoretical framework of Leventhal et al. (1998). The instrument that we analyse here is the revised version, IPQ-R (Moss-Morris et al. 2002). The questionnaire consists of generic statements like 'my illness will last a long time' and 'my illness is a mystery to me'.

The second instrument is constructed for the measurement of self-regulation in a study of a treatment for serious overweight and morbid obesity (Larsen 2004; Zijlstra et al. 2006). At the start of the obesity project, it was hypothesized that self-regulative cognitions would predict the outcome of the treatment. In the research of the effectiveness of the obesity treatment (Larsen 2004), an obesity-adapted version of the IPQ-R was used and called the Obesity Cognition Questionnaire (OCQ). This obesity-specific version of the IPQ-R contains items such as 'my obesity will diminish in the long run' and 'my obesity is hereditary'. In comparison to the IPQ-R, this adaptation is therefore directed towards a more specific goal, the measurement of self-regulation of obesity. However, the results of the study showed that in many cases the treatment offered sufficient weight loss, but in some cases there was no weight loss in the long term. These cases could not be predicted from the available personality measurements and, in contrast to expectations, self-regulative cognitions did not predict weight outcome (Zijlstra et al. 2006). A possible explanation for this lack of result is that the measurement of self-regulation cognitions is insufficiently valid.

From the self-regulation model it can be deduced that beliefs about one's capability to control eating behaviour are related to weight loss. Zijlstra et al. assumed that the outcome of a treatment for obesity will depend on the degree to which the patient succeeds in adopting healthy and enduring dietary changes. It is further assumed that these behavioural actions depend on self-regulation cognitions; the beliefs about one's capability to regulate health-related behaviour and the course of an illness.

The question we focus on, therefore, is whether the content of these questionnaires is sufficient for the measurement of self-regulation in these patients. We will use qualitative

facet analysis to study the content of both questionnaires and in this way we will demonstrate the usefulness of qualitative facet analysis for improvement of these questionnaires.

We present an analysis of both the IPQ-R and the OCQ as examples of qualitative facet analysis. In our examples we use Rotter's concepts of internal and external locus of control, to distinguish whether patients locate the source of possible improvement in their condition in sources inside or outside themselves. We are specifically interested in the measurement of how the patient perceives his or her own problem for the prediction of obesity treatment results, and our analysis of the content of the IPQ-R and the OCQ is guided by the viewpoint of internal and external locus of control. We would like to point out that this viewpoint is different from the framework of [Leventhal et al. \(1998\)](#), which is directed to illness representation, self-regulation and coping procedures in the case of health threats. Eating disorders must be distinguished from a disease that can be cured medically. For a large part it is a problem that is determined by the eating behaviour of the patient and there is no pill or other cure that will end the problem. [Larsen \(2004\)](#) and [Zijlstra et al. \(2006\)](#) studied the LAGB treatment (Laparoscopic Adjustable Gastric Banding). This treatment is intended to support the patient in changing his or her eating behaviour by providing a physical limitation to the amount the patient can eat. It is a so-called restrictive type of bariatric operation designed to induce weight loss by limiting food consumption. It is expected that a patient who perceives the LAGB-procedure as a cure for the problem is more likely to fail in changing behavioural patterns than a patient who is fully aware that success is strongly dependent on behavioural changes. A patient who sees his illness, as well as the possible cure, as being fully dependent on external forces is less likely to apply the necessary behavioural changes, while a patient who is aware of his own potential to improve the condition is more likely to succeed.

This is in line with Rotter's theory of Locus of Control ([Rotter 1989, 1966](#)). Locus of control refers to a person's general belief about what determines the reinforcements in life. People with a strong internal locus of control believe that success or failure is due to their own efforts. In contrast, 'externals' believe that the reinforcements in life are controlled by luck, chance, or powerful others. Therefore, they see little impact of their own efforts on the amount of reinforcement they receive. Patients who mainly attribute the control over their obesity to external forces such as misfortune, the right treatment and the expertise of the physician are more likely to fail in the reduction of their weight. In many diseases, a strong belief in physician and treatment is fully justified, but in the case of LAGB surgery, it is more likely that patients will succeed who have a strong belief in their own powers to change their own behaviour. A strong belief in the healing powers of treatment or the physician may be counter productive for the desired behavioural change.

## 2 Method

Basically, qualitative facet analysis uses the item content for systematic comparison and ordering of the items. It starts with the identification of the concrete phrases within the items that represents an aspect of the construct to be measured. A theory that indicates these relevant aspects is very helpful. These concrete phrases are labelled with a more abstract identifier or facet. Most questions contain more than one relevant content element and therefore a sentence, called a mapping sentence ([Guttman 1994](#)), is formed to connect these facets. In this way, the content of the items is represented in a more abstract form, representing the content in a general and systematic manner. Also, the mapping sentence can be used to form new, additional or alternative items.

Items that share facet-elements are more alike, and items that represent related facets are more alike than items that represent unrelated facets. In this way the items can be ordered on the basis of their facets. It is assumed that items that share facets and/or facet elements are more alike as a stimulus and elicit more similar answers. This is a most valuable feature of Guttman's Facet Theory (Shye et al. 1994). The proximity between answers can be understood directly from the similarity in content of the items (Foa 1965).

### 3 Analysis of the IPQ-R

We will first use a few questions from the IPQ-R to illustrate the process of analysis. Before commencing the analysis, all items are sorted on sentence length to prevent the ordering of the items from reflecting a known structure. After the analysis, the items have been numbered 1 to 38 (Table 1).

We start with a particular question and try to distinguish relevant parts of the content, which form possible content facets. The content of the items and the results of the analysis are presented in Table 1. We start with the item:

*I have a clear picture or understanding of my condition.*

Possible facet elements are indicated with the use of bold face and italics. When we have identified an essential content component, the expression is considered as the facet element, in this case 'I' and 'a clear picture or understanding'. On the basis of several facet elements, we formulate labels that describe the facet elements using the concepts of a relevant theory. The next step is to formulate a tentative template or mapping sentence for the question. In this case, we choose [Internal locus of control] and [Form of control]:

**[Internal locus of control]** has *[form of control]* over my illness.

In this case 'I' is a specification or element of the more abstract 'Internal locus of control', while 'a clear picture or understanding' is an element of 'form of control'. This tentative template allows us to look for items that share the same elements, and for items that contain different elements. Items that do not share content elements need another tentative template. Items that share similar content can be grouped under a single template, and a more definitive mapping sentence can be formulated that both labels the facet elements in an insightful manner and combines the different facets in a more or less readable sentence. In this way, the analyst describes the essential content of the items in a more general and abstract manner. When items contain highly similar content, it becomes difficult or impossible to distinguish items on the basis of that content. In the case of the IPQ-R, all questions contain 'my condition', 'my illness' or 'my symptoms'. We use 'my illness' as a general indication and ignore the differences of 'my condition', 'my illness' and 'my symptoms', considering these as different but equivalent expressions. They do not clearly distinguish the questions and could be exchanged. Therefore, they are not considered as facet elements.

The next step is to look for other items which may contain the same facets. Compare the following three items:

*I have a clear picture or understanding of my condition.*

*I don't understand my illness.*

*My illness doesn't make any sense to me.*

'A clear picture or understanding', 'understand' and 'make any sense' are considered as equivalent instances of the [form of control] understanding, and 'I' and 'to me' are seen as

**Table 1** Analysis of the 38-item revised Illness Perception Questionnaire (IPQ-R)

Responses: Strongly disagree–disagree–neither agree nor disagree–agree–strongly agree

**Internal locus of control**

1. **I have a clear picture or understanding** of my condition (4).
2. **I don't understand** my illness (4).
3. My illness doesn't **make any sense to me** (4).
4. My illness is **a mystery to me** (4).
5. The symptoms of my condition are **puzzling to me** (4).
6. **My actions will have no effect on the outcome** of my illness (6).
7. **Nothing I do will affect** my illness (6).
8. **There is a lot which I can do to control** my symptoms (6).
9. **What I do can determine whether** my illness gets better or worse (6).
10. **I have the power to influence** my illness (6).
11. **The course of my illness depends on me** (6).

**External locus of control**

12. **My treatment can control** my illness (3).
13. **My treatment will be effective in curing** my illness (3).
14. **The negative effects of my illness can be prevented (avoided) by my treatment** (3).

**No locus of control**

15. **There is nothing which can help** my condition (3).
16. **There is very little that can be done to improve** my illness (3).

**My illness is associated with [negative emotion]**

17. Having this illness makes me feel **anxious** (2).
18. I get **depressed** when I think about my illness (2).
19. My illness makes me feel **afraid** (2).
20. My illness makes me feel **angry** (2).
21. My illness does **not worry** me (2).
22. When I think about my illness I get **upset** (2).

**Concerning my illness, I expect [future development]**

23. I expect to **have this illness for the rest of my life** (1).
24. I go through **cycles in which my illness gets better and worse** (2).
25. My symptoms **come and go in cycles** (2).
26. The symptoms of my illness **change a great deal from day to day** (2).
27. My illness is **very unpredictable** (2).
28. My illness will **improve in time** (1).
29. My illness **will last a short time** (1).
30. My illness **will last for a long time** (1).
31. This illness **will pass quickly** (1).
32. My illness is **likely to be permanent rather than temporary** (1).
33. My illness has **[secondary consequences]**
33. My illness has **serious financial consequences** (5).
34. My illness has **major consequences on my life** (5).
35. My illness causes **difficulties for those who are close to me** (5).
36. My illness does **not have much effect on my life** (5).
37. My illness strongly **affects the way others see me** (5).
38. My illness is **a serious condition** (5).

instances of [Internal locus of control]. This supposes that other items indicate different loci of control and/or different forms of control. This is the case, as can be seen in Table 1.

This search for facets does not lead directly or automatically to facets that can be combined indiscriminately. This is illustrated here by the facet [form of control] which is different for internal loci and external loci of control. If we look at the concrete phrases that indicate forms of control (Table 1), we see that internal forms of control are cognitive ('understand'; 'make sense'), or behavioural. The descriptions of behavioural forms of control are quite abstract: 'have no effect', 'control', or 'determine', and hardly offer a specification of the form of

behavioural control. External forms of control used in the IPQ-R are 'control', 'cure' and 'prevent'. The latter two are not used as an internal form of control. It is therefore concluded that [form of control] is nested within [locus of control].

Next to the lead that is given by the Locus of Control perspective, our analysis is guided by the behavioural nature of eating disorders. The content of the items can roughly be discriminated between items that clearly mention a locus of control (1–16) and items which reflect control (or lack of it) more indirectly, that is, items that refer to associated emotions (17–22), future expectations of the development of the health problem (23–32), and secondary consequences (33–37). Item 38 ('My illness is a serious condition') has, as far as its content is concerned, no clear connection with the other items. It reflects neither control, nor emotions, secondary consequences nor future expectations.

We distinguish three different loci of control in the first 16 items: 'I' (items 1–11), 'My treatment' (items 12–14) and 'Nothing' (items 15 and 16). The questions that refer to 'I' reflect internal control or lack of it, while items that put the treatment in control can be seen as representations of external control. The items referring to 'I' can be further distinguished in items referring to understanding and to items referring to behavioural control. 'Understanding' is covered by five phrases, which we consider as synonymous: one positive ('clear picture and understanding') and four negative ('not understand'; 'not make any sense'; 'a mystery'; and 'puzzling'). The questionnaire covers 'not understanding' quite extensively (items 2–5), and this seems to be somewhat overrepresented. Other forms of cognitive control, such as ignoring symptoms, attention switching, or applying (negative) self-reinforcement are not covered by the IPQ-R. To remedy this underrepresentation, it is possible to formulate new items that cover these forms of cognitive control on the basis of the same mapping sentence: 'I can ignore my symptoms for a considerable time', 'When I feel sick, I look for an activity to distract myself', and 'When I feel exhausted, I remind myself that I want to lead a life as normal as possible'.

Four items reflect behavioural control of the patient (6–9). Items 6 and 7 are both negative, and have a similar content. Both indicate that behavioural actions do not influence the illness. Items 8 and 9 cover positive behavioural control. Two items (10 and 11) do reflect internal control but are not clearly behavioural or cognitive in nature. They refer in general to the power or possibilities to influence the illness. These questions can easily be extended to cover forms of cognitive or behavioural control more clearly. Items like 'I have the power to ignore my illness some of the time', 'Following doctor's orders helps me to reduce the effects of my illness' and 'Being busy helps me to distract myself from the effects of the illness' would specify various possibilities of the patient to exert control over the illness.

The items that indicate control of the illness by the treatment are represented with three items (12–14). It may be worthwhile to extend this number to gain a clearer view on how the patient perceives the role of the treatment. Possible new items are: 'My treatment will have a clear effect on the outcome of my illness' and 'The course of my illness depends on my treatment'. From the viewpoint of locus of control, external control is often represented by powerful persons. In the case of patients, the physician is such a strong power figure. The treating physician is however not represented in the IPQ-R. Items like 'I have complete confidence that my physician will cure my illness' and 'My physician has a clear picture and understanding of my condition' may be indicative of external control. Interestingly, the IPQ-R also has two items (15 and 16), which reflect no locus of control. Both items are formulated negatively, indicating helplessness.

It should be noted that the IPQ-R also contains items that have a quite different format, and therefore another mapping sentence. The IPQ-R covers many different aspects of illness perception. Moss-Morris et al. (2002) recognized seven different factors or sub-scales.

Dissimilar content can be represented by different mapping sentences, and it can be expected that the responses on these items are dissimilar too. Otherwise, it can be expected that items from a single mapping sentence are more highly correlated and can form a factor. In this way, qualitative facet analysis also results in an expected structure of the observed responses. Often a single questionnaire comprises different facets and/or mapping sentences and therefore different expected factors. It is possible to test such an expected structure using confirmative factor analysis or Gutman's smallest space analysis.

The other items of the IPQ-R cover the subject's negative emotions that are related to the illness (17–22), expectancies of the future development of the illness (23–32) and secondary consequences of the illness (33–37). These items serve other purposes than the measurement of control and are therefore not directly connected to control. The items concerning the expected duration of the illness are very similar and seem somewhat redundant in content. It may be interesting to study how these questions are related to control.

A questionnaire with a clear structure of item content in most cases also has a clear factor structure of the observed responses. It is expected that items that represent the same mapping sentence are correlated and load on a single factor or are in close proximity when projected in the same space. In Table 1, the numbers behind the items refer to the factors that are reported by Moss-Morris et al. (2002). Clearly, content structure and factor structure come close together. Foa (1958) found that, on the average, variables with more facet elements in common correlated higher than variables with fewer common elements. However, the weight of the content facets is relevant in this respect (Foa 1965). As QFA is based on comparison, it can project no more than a possible expected factor structure. A strong theory is a necessity to indicate possible weights.

Our analysis is primarily directed to the question of the extent to which the dimension of internal–external locus of control is covered, as this is of specific interest for our example research into obesity treatment. Clearly, the IPQ-R can be extended to cover this dimension more extensively.

#### 4 Analysis of the OCQ

The Dutch Obesity Cognition Questionnaire is an adaptation of the IPQ-R, specifically for the study of obesity patients. As this questionnaire is solely used in the study of patients with excess weight problems, it makes sense that 'illness' is replaced by the more specific 'excess weight'. Several items are literally translated from the original. In comparison with the IPQ-R, there is a difference of scope: obesity is not an illness or medical problem in the strict sense, even though the evaluated LAGB-treatment is a medical procedure. The OCQ is used in the Netherlands, but for the convenience of the reader the items are re-translated into English. Table 2 shows the items and the result of the analysis. After the analysis, the items have been numbered 1 to 25. Almost all items refer to 'my excess weight', with little variation.

As can be seen in Table 2, the items concerning control of excess weight (1–15) especially differ considerably from the items in the IPQ-R that refer to control of the illness. These items (1–15) cover various aspects of internal and external control and can be viewed from this perspective. The items related to an internal locus of control almost all refer to behavioural control (1–6), with phrases like 'my own behaviour', 'my eating habits' and 'I do'. These phrases are quite undetermined, and do not refer to concrete behaviours such as foraging for food, eating, drinking or (physical) exercising. Items 7 and 8 refer to some undetermined internal power to influence weight ('It depends especially on my self' and 'I can'), but are



**Table 2** Analysis of the 25-item obesity cognition questionnaire (translated from Dutch)

Responses: Strongly disagree–disagree–neither agree nor disagree–agree–strongly agree

**[Internal locus of control]** *[effects]* my weight.

1. My (excess) weight *is* for a large part *a consequence* of **my own behaviour**.
2. My (excess) weight *is* in an important degree *the consequence* of **my eating habits**.
3. Predominantly, my weight *is determined* by what **I do**.
4. There are **many things that I can do** to get my (excess) weight *under control*.
5. Whatever **I do**, I *will remain* heavy.
6. Whatever **I do**, I *will probably gain* weight.
7. **It depends especially on myself** *how fast I lose* my (excess) weight.
8. **I can ascertain** whether my weight *increases or decreases*.

**[External locus of control]** causes my (excess) weight.

9. **My moods and emotions** have played an important role *in causing* my (excess) weight.
10. My (excess) weight *is caused* for an important part **by tensions**.
11. My (excess) weight *is caused* by **a physical disorder**.
12. My (excess) weight *is caused* by **bad medical treatment in the past**.
13. My (excess) weight *is the consequence* of a **too large a quantity of fat cells**.
14. My (excess) weight *is the consequence* of **a hereditary disorder in my family**.
15. *To loose* weight is mainly **a question of disposition or luck**.

My (excess) weight has **[expected development]**

16. My (excess) weight **will decrease rapidly**.
17. My (excess) weight **will decrease in the long run**.
18. **After some time it becomes easier to live** with excess weight.
19. My (excess) weight is **more permanent than of a passing nature**.

My (excess) weight has **[secondary consequences]**

20. My (excess) weight has **serious financial consequences**.
21. My (excess) weight has **large consequences on my life**.
22. My (excess) weight has **no large consequences on my life**.
23. My (excess) weight has **strongly influenced the way I see myself as a person**.
24. My (excess) weight is **strongly decisive for the way others see me**.
25. My (excess) weight is a serious disorder.

neither clearly behavioural nor cognitive in nature. As in the IPQ-R, the second facet refers to a form of control, but in this case we had great difficulty in finding an adequate facet label. In the end we chose [effects], but it should be noted here that this label is hardly more abstract than the phrases used in the items 1–4: ‘is a consequence of’, ‘is determined’, ‘to get under control’. In items 5 and 6, the effect on weight is described by the phrases ‘I will remain’ and ‘I will probably gain’. Items 5 and 6 refer to behaviour (I do), but emphasize its *ineffectiveness*. Item 7 describes most clearly the effect on weight and is in fact the only item that refers to losing weight. Item 8 on the other hand is quite undetermined, by referring to ‘increases or decreases’. Several of these items contain phrases like ‘for a large part’, ‘predominantly’, ‘especially’, which seem to have no other purpose than making the items less absolute. It should be noticed that the items are not very specific in the form of control. Forms of cognitive control, such as understanding the nature of the problem, ignoring symptoms, attention switching or applying some form of self-reinforcement, are not mentioned. Possible examples could be items such as: ‘Although it is difficult, I know that I can only lose weight by eating less’, ‘I can ignore my hungry feelings for a considerable time’, ‘When I feel hungry, I look for an activity to distract myself’, and ‘When I would like a snack, I remind myself that I don’t like to be overweight’. As far as behavioural control is concerned, neither other activities nor exercising are mentioned. In comparison to the IPQ-R, these items indicate the locus of control and the control it exerts in an abstract manner. All in all the items are intrinsically abstract, which made it hard to formulate the abstract mapping sentence. It



also raises the question of whether the abstract phrases used in the items are sufficiently adapted to the respondents.

The items 9 to 15 all indicate some form of external causation outside the control of the patient, such as 'tensions' (10), 'luck' (11), 'a large quantity of fat cells' (12), 'a hereditary disorder' (14), etc. Item 9 refers to 'moods and emotions', which is here also considered as a form of external control, as most humans are not in full control of their emotions. As with the IPQ-R, the role of the physician as an external power figure is no part of the OCQ, and for instance 'I have complete confidence that my physician will cure my weight problem', could be added to include this. In the case of obesity, the role of the dietician could be represented by an item like 'My dietician makes sure that I eat less', or the statement, 'My dietician controls what I eat' could be used to exemplify the role of the dietician as an external force. In contrast to the IPQ-R, no items are included concerning the treatment. Items like 'My treatment helps me to control my weight', and 'My treatment will be effective in curing my weight problem', could form interesting additions. The effect on weight is predominantly represented by phrases like 'is caused' and 'is the consequence'. Notably, phrases that make the items less absolute are missing here, while the role of the external forces are stressed in items 9 and 10 by the phrase 'an important role'. The other items of the OCQ refer to expected development or secondary consequences. As these items are derived more directly from the IPQ-R, we refer to the analysis of that scale.

Clearly, various forms of internal and external control are lacking, and it is recommended that items be added to cover this. In this way, the OCQ can be improved to cover self-regulation of obesity patients in a better way.

## 5 Discussion

In this paper we have focused on an important part of questionnaire construction, the content of items. The intended subject of the questionnaire considered, the measurement of self-regulation of obesity patients undergoing a bariatric operation, is especially interesting from the viewpoint of internal versus external control. On the one hand, the intention of the operation is to support behavioural change in these patients, and this requires considerable motivation of the patients and therefore belief in their own potential to change their behaviour effectively, that is, internal control. On the other hand, this operation is an invasive medical treatment, which might easily be perceived as a possible cure, that is, an external force. To apply this specific diversity in content for this applied goal is a challenge that requires special attention. It is a clear example of the adaptation of a general theoretical construct in applied health research. The results of the analysis show how the questionnaire can be strengthened to improve the coverage of both internal and external control issues.

Qualitative facet analysis evaluates the item content of an existing questionnaire. It is a useful addition to quantitative methods that analyse the observed answers. The method helps to discover the content areas that are underrepresented or overrepresented. The abstracted mapping sentences are a valuable tool for the formulation of new questions, to resolve a certain underrepresentation. The two questionnaires for illness perception are evaluated from the perspective of a specific goal—the ability to measure whether the patient perceives the locus of control over his illness as external or internal. A main conclusion is that the content can concentrate more on forms of both internal and external control and, with that goal in mind, various suggestions are made for additional items.

In comparison with other methods for item analysis, the qualitative analysis of the content of items offers several essential advantages. Gutman's Facet Theory gives us the tools to

describe the content of items, and the similarity of items as stimuli. The accomplishment of Facet Theory is that it clarifies the relation between construct, questionnaire content, and the observed answers. This framework makes it possible to formulate new items for content not yet covered, or extra items to strengthen an area that is insufficiently covered. As a result, the content of the items can be tailored to improve on specific desired aspects of the construct and to acquire the responses needed for answering the research questions. This approach has great value specifically for the improvement of existing measurement instruments. The researcher can build on existing knowledge and does not have to build a new questionnaire from scratch. Systematic comparison of the contents of items with each other and with the constructs to be measured, allows the careful diagnosis of item content and allows the evaluation of the coverage the scale has in the light of the relevant research questions. Improving and tailoring a questionnaire is more easy than creating a questionnaire on the basis of a construct alone.

In contrast, both reliability analysis based on classical test theory and modern item-response theory are response focused. These techniques allow improvement of the scale by discarding items that add too little to reliability or the separation of persons. It provides a quantitative measure concerning a specific desirability of the elicited responses, and allows for tailoring a larger collection of items to a smaller, more reliable collection. Reliability analysis does not allow conclusions concerning the content of the items and is not specific in that respect. It provides no tools for strengthening the content or for creation of a larger collection that covers the construct in a better way. Nevertheless, these techniques are often used as the only instrument to assess the quality of a scale. As a result, the acquired collection of items may be reliable, but can be insufficient to cover the aspects of the construct that are necessary to answer the relevant research questions.

Facet Theory allows us to hypothesize about the expected answers and whether they are related or not. As we have illustrated in the case of the IPQ-R, a qualitative facet analysis can result in an ordering of the items that is comparable to a factor structure. Once a questionnaire is adapted on the basis of exploratory principal component analysis and has a clear factor structure, an independent qualitative facet analysis can reconstruct this structure to some extent. Of course, this is dependent on the strength of the factor structure. When analysing raw items, which have not yet been polished by factor analysis, qualitative facet analysis can indicate a possible factor structure. If this factor structure is desirable, it is possible to perform a confirmatory factor analysis to prove whether this specific structure can be found in the observed answers as well.

A specific problem we encountered when analysing both the IPQ-R and the OCQ, was that the phrases in the items are sometimes quite abstract, and hardly lend themselves to further abstraction. An argument for keeping the content abstract and somewhat vague, is that it allows for the projection of variant respondent situations. The counter-argument is that it may allow for unwanted variation in the answers, if the respondents can project very different realities into an abstract phrase. Furthermore, the use of abstract phrases such as 'hereditary disorder' can limit the usefulness of the questionnaire for respondents when they are not familiar with these phrases.

When a questionnaire is used in applied research, there are often specific problems with the definition of the population or the selection of respondents. Mapping sentences used in Facet Theory usually cover the definition of the population explicitly, but solely analysing the content of items only covers problems with the selection of respondents as far as the application of this content to the respondents is considered. Especially in the case of a specific adaptation of a questionnaire in applied research, the selection of respondents may require special attention.

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