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Guy Notelaers [ab]; Stale Einarsen [c]; Hans De Witte [a]; Jeroen K. Vermunt [d]
[a] Department of Psychology, Work and Organizational Psychology Unit, Katholieke Universiteit Leuven, Belgium
[b] Directorate of Research for the Improvement on Working Conditions, Federal Government, Belgium
[c] Department of Psychosocial Science, University of Bergen, Norway
[d] Faculty of Social and Behavioral Sciences Methodology and Statistics, University of Tilburg, The Netherlands

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Measuring exposure to bullying at work: The validity and advantages of the latent class cluster approach

GUY NOTELAERS[1,2], STALE EINARSEN[3], HANS DE WITTE[1], & JEROEN K. VERMUNT[4]

[1]*Department of Psychology, Work and Organizational Psychology Unit, Katholieke Universiteit Leuven, Belgium;* [2]*Directorate of Research for the Improvement on Working Conditions, Federal Government, Belgium;* [3]*Department of Psychosocial Science, University of Bergen, Norway &* [4]*Faculty of Social and Behavioral Sciences Methodology and Statistics, University of Tilburg, The Netherlands*

Abstract
This paper addresses the construct and predictive validity of two methods for classifying respondents as victims of workplace bullying. Although bullying is conceived as a complex phenomenon, the dominant method used in bullying surveys, the operational classification method, only distinguishes two groups: victims versus non-victims. Hence, the complex nature of workplace bullying may not be accounted for. Therefore a latent class cluster approach is suggested to model the data, which was obtained by using the Negative Acts Questionnaire (NAQ) administered to employees in Belgium ($n = 6,175$). Latent class modelling is a method of analysis that does not appear to have been used in occupational health psychology before. In this study, six latent classes emerged: "not bullied," "limited work criticism," "limited negative encounters," "sometimes bullied," "work related bullied," and "victims." The results show that compared to the traditional operational classification method, the latent class cluster approach shows higher construct and higher predictive validity with respect to self-assessments and indicators of strain and well-being at work. The consequences of these results for theory, future research, and practice are discussed.

Keywords: *Workplace bullying, work-related stress, latent class analysis, operational classification, validity, strain, well-being*

Introduction

This paper investigates the validity of two methods for classifying respondents as victims of workplace bullying, using data obtained by means of the Negative Acts Questionnaire (NAQ; Einarsen & Raknes, 1997). The first and very widespread method for the identification and assessment of victims of bullying is the operational classification method proposed by Heinz Leymann (1990a). On the basis of responses to a list of bullying behaviours, the frequency of bullying may be estimated by calculating the number of respondents exposed at least once a week to at least one such behaviour over a period of 6 months. In spite of the widespread use of this operational classification method among

scholars, research on its usefulness raised concerns with respect to its construct validity (Hoel, Rayner, & Cooper, 1999; Mikkelsen & Einarsen, 2001; Salin, 2001).

The present study therefore proposes an alternative method for identifying bullied individuals, using latent class cluster analysis (Magidson & Vermunt, 2004). This method, based on statistical analyses of the responses to a list of bullying behaviours included in the NAQ, distinguishes various groups according to the level and nature of their exposure to bullying. The aim of the present study is to examine the construct and predictive validity of the latent class approach to the identification of bullied workers, in comparison with that of the operational classification method proposed by Leymann (1990a). We will first discuss the nature of bullying, after which the two approaches to the classification of workers as victims of bullying are compared using data from 6,175 Belgian workers.

Bullying defined

Some consensus on how to define bullying at work has emerged, at least in Europe (Einarsen, Hoel, Zapf, & Cooper, 2003). According to Einarsen and colleagues:

> Bullying at work means harassing, offending, socially excluding someone or negatively affecting someone's work tasks. In order for the label bullying (or mobbing) to be applied to a particular activity, interaction or process it has to occur repeatedly and regularly (e.g., weekly) and over a period of time (e.g., 6 months). Bullying is an escalating process in the course of which the person confronted ends up in an inferior position and becomes the target of systematic negative social acts. A conflict cannot be called bullying if the incident is an isolated event or if two parties of approximately equal "strength" are in conflict. (Einarsen et al., 2003, p. 15)

Thus, bullying is about frequent and prolonged exposure to negative acts. It may be triggered by a work-related conflict, in which the target becomes increasingly stigmatised, victimized, and unable to cope with the situation (see also Einarsen 1999; Leymann, 1990a). Hence, Matthiesen, Raknes, and Røkkum (1989) argue that bullying must be looked upon as a continuum from "not at all exposed" to "highly exposed," and not as an either/or phenomenon. Further, victims of bullying at work may be exposed to a wide range of different behaviours, be it direct or indirect kinds of behaviours, be it in the form of persistent insults or offending remarks, persistent criticism, or even personal or physical abuse (Einarsen, 2000a). Others are given the "silent treatment," experiencing social exclusion and isolation. The only common denominator is that these behaviours are "used with the aim or at least the effect of persistently humiliating, intimidating, frightening, or punishing the victim" (Einarsen, 2000b). Hence, a range of groups may exist with different levels of exposure to bullying, making it arbitrary to decide precisely who is bullied and who is not. Different targets of bullying may also experience quite different types of bullying behaviours. It is not surprising that the exact frequency of bullying varies highly between different studies (Zapf, Einarsen, Hoel, & Vartia, 2003) that use different criteria when deciding who is actually a victim and who is not. Depending on the reported negative behaviour, the detrimental impact on the target person's health may also differ significantly (Hoel, Faragher, & Cooper, 2004).

Previous and new approaches to the measurement of bullying at work

Generally, two approaches to the measurement of bullying at work exist (Einarsen et al., 2003): (1) perceived victimization from bullying at work (subjective measurement); and (2) perceived exposure to specific bullying behaviours (objective measurement). The first approach is based on a self-labelling method where respondents are asked to indicate whether or not they perceive themselves a victim of bullying, most often after being presented with a definition of the term. This approach is known in the bullying literature as the subjective (or self-assessment) method (Zapf & Einarsen, 2003), as it is based on the subjective perception of the respondent.

The other frequently used approach stems from the work of Heinz Leymann, who presented the respondent with a set of items measuring exposure to specific kinds of bullying behaviours. This method is called the operational (classification) method (OCM) or the criterion-based method. This method (Leymann, 1990a) defines the victim group as those respondents who report being subjected to at least one negative act specified in his inventory, on a weekly or daily basis, for a period of 6 months. Acts that happen on a weekly basis or more often are coded as "1 = act," whereas all other frequencies are coded as "0 = no act." All acts are then summed. When the sum is zero, the respondent is not a victim; otherwise, the respondent is considered to be a victim of bullying. A range of studies have used this method, employing dichotomized scores, to differentiate between victims and non-victims of bullying (e.g., Einarsen & Raknes, 1997; Vartia, 1996; Zapf, Knorz, & Kulla, 1996). The most commonly used measurement instruments in this tradition are the Leymann Inventory of Psychological Terror (LIPT; Leymann, 1990b) and the currently widely used NAQ (Einarsen & Hoel, 2001; Einarsen & Raknes, 1997). The operational classification method has been denoted as a more objective method as it does not require the respondents to label their experience as bullying and the decision as whether someone is bullied resides with the researcher (see also Einarsen, 2000a; Frese & Zapf, 1988).

When the OCM and the self-labelling method are combined, not even half of the respondents categorized as victims according to the OCM perceive themselves as victims of bullying according to the subjective method (Hoel, Rayner, & Cooper, 1999; Mikkelsen & Einarsen, 2001; Salin, 2001). However, most (but not all) self-labelled victims of bullying are also characterized as targets following the OCM. This rather poor overlap questions the construct validity of the OCM. As a consequence, estimated "prevalence rates" vary strongly according to the method used. When the OCM is used, the frequency of bullying seems to vary between 8 and 15%, compared to a frequency of 2 to 10% when subjective methods are used to estimate the proportion of victims (Zapf et al., 2003).

There are also other reasons for questioning the validity (in particular the construct validity) of the OCM. First, the cut-off point provided by the OCM is an arbitrary choice that reduces the complex phenomenon of workplace bullying to a strict either/or phenomenon. Second, since such objective methods differ in the number of acts listed in the questionnaire used, and since not every negative act discriminates as well between victims and non-victims (Notelaers & De Witte, 2003), the number of reported victims may be a function of the number and selection of items included in the inventory. Third, employees who are frequently exposed to a wide range of specific behaviours, but where each specific behaviour occurs only now and then, are not regarded as victims of bullying. Of course, a low level of exposure to many different negative acts could also be conceived as bullying.

Consequences of bullying

The last decade has witnessed a growth in studies reporting negative effects on the health and well-being of targets of bullying at work. Psychosomatic complaints (Agervold & Mikkelsen, 2004; Leymann & Gustafsson, 1996; Mikkelsen & Einarsen, 2002; Zapf et al., 1996) and low sleep quality (Björkqvist, Osterman, & Hjelt-Bäck, 1994; Leymann & Gustafsson, 1996; Zapf et al., 1996) correlate substantially with exposure to workplace bullying. In Europe, evidence has been presented that victims of bullying may even develop traumatic disorders (e.g., general anxiety and posttraumatic stress disorders; Björkqvist et al., 1994; Leymann & Gustafsson, 1996) or prolonged stress disorder (Mikkelsen & Einarsen, 2002), suggesting that workplace bullying can have serious and detrimental effects on the health and well-being of its targets. Accordingly, Zapf et al. (1996) report that (self proclaimed) victims differ almost two standard deviations with respect to work-related stress in comparison to non-exposed individuals. However, research using the operational classification method to distinguish victims from non-victims shows that the difference between the two groups is usually smaller (not larger than .65 standard deviation; see Baillien, Neyens, Notelaers, & De Witte, 2006; Einarsen & Hoel, 2004). Hence, next to its construct validity, the predictive validity of the OCM is doubtful as well.

A latent cluster approach to model workplace bullying

The complex and dynamic nature of the bullying phenomenon, and the comments raised earlier in this paper, plead for an alternative operational classification method to calculate targets of bullying, based on responses to inventories on exposure to bullying behaviours. The question is whether a statistical technique for the calculation of the number of victims can be developed as such an alternative. If so, this application must also take into account the fact that exposure to workplace bullying is measured with highly skewed variables, using categorical response variables (e.g., Einarsen & Raknes, 1997). Elsewhere (Notelaers, De Witte, Vermunt, & Einarsen, 2006), we have explored whether a cluster modelling method of analysis called latent class cluster (LC) modelling (Magidson & Vermunt, 2004; Vermunt & Magidson, 2002) could be such an alternative. This technique has been used in other areas of science, but does not appear to have been used before in occupational health psychology.

LC is a statistical method that classifies respondents into mutually exclusive groups with respect to a not directly observed (latent) trait (e.g., target of bullying). The LC analysis starts with the assumption that there is only one group, and subsequently estimates two (e.g., not bullied/bullied), three, four ... and finally *n* different classes, until a LC model is found that statistically fits the data (Magidson & Vermunt, 2004). An important difference from traditional cluster methods (like *K*-means clustering) is that LC analysis is based on a statistical model that can be tested (Magidson & Vermunt, 2002). As a consequence, determining the number of latent classes is less arbitrary than when using traditional cluster methods.

Hence, this method allows for empirically testing whether different target groups exist, based on the responses to an inventory measuring exposure to different kinds of bullying behaviours. Elsewhere we reported the results of a Belgian study, using latent class cluster analysis based on data obtained by means of the NAQ (Notelaers et al., 2006). Details of these analyses and further information on the LC method can be obtained from the first author. The latent class analysis suggested a six-cluster bullying model. Since the present paper builds upon this previous research, we briefly discuss these six groups here

Table I. Mean conditional probabilities (expressed as a percentage; standard errors in brackets) for four answer categories as a function of latent class cluster type, as reported in a previous study (Notelaers et al., 2006).

	Clusters					
	Not bullied	Limited work criticism	Limited negative encounters	Sometimes bullied	Work related bullied	Victims
Percentage of participants in this cluster	35	28	17	9	8	3
Answer categories						
Never	93 (0.29)	72 (0.29)	64 (0.26)	31 (0.19)	55 (0.25)	15 (0.13)
Now and then	7 (0.08)	25 (0.22)	34 (0.21)	58 (0.21)	23 (0.09)	31 (0.07)
Once a month	0 (0.01)	2 (0.04)	2 (0.02)	8 (0.05)	12 (0.07)	22 (0.05)
Once a week or more	0 (0.01)	13 (0.02)	0 (0.01)	3 (0.03)	11 (0.10)	32 (0.12)

(see Table I). For each group, Table I summarizes the mean conditional probability (CP) obtained in this earlier study to respond "never," "now and then," "once a month," or "once a week or more" to specific negative acts. These mean conditional probabilities reflect the average probability that respondents in a given cluster or group will choose one of the four response alternatives. The cluster labels appear in the heading of Table I. The second row represents the size of the clusters (i.e., the proportion of respondents in each cluster). After the mean CPs, Table I gives the standard errors (in brackets).

Respondents from the first cluster were characterized by a mean CP of 93% to have been "never" subjected to any of the negative acts in the NAQ during the previous 6 months. Consequently, they were labelled as "not bullied." This cluster included 35% of the study participants.

The respondents of the second cluster were also characterized by a high mean CP to answer "never" (72%). However, some negative acts occurred more frequently, including "withholding information," "getting work below the level of one's competence," and "my work is not valued." Hence, we labelled this cluster the "limited work criticism" cluster. This cluster was the second largest cluster and covered about 28% of the respondents.

The respondents of the third cluster were characterized by two mean CPs. The mean CP that they were "never" subjected to negative acts was 0.64. The mean CP that they were "now and then" subjected to such acts was 34%. For some acts, this mean CP was even higher, like "withholding information," "insults," "gossip," "remarks concerning private life," and "work that is not valued." This suggested that these respondents were subjected to a limited amount of work- and person-related criticism. We thus labelled this cluster as "limited negative encounters." Nearly 17% of the respondents belonged to this group.

The fourth cluster was characterized by a mean CP of almost .60 that respondents were "now and then" subjected to negative acts. For some acts, this CP was even higher, like "insults," "gossip," "silent or hostile reactions," and "work is not valued." This cluster was labelled as "sometimes bullied." Nine per cent of the sample belonged to this cluster.

The fifth cluster was characterized by a mean CP of 55% as answering "never" to all negative acts. This cluster, however, reported to be subjected to various work-related negative acts, like "withholding information," "work under level of competences," "work not valued," and "opinion does not count." This suggested that this was a "work-related bullying" cluster. Eight per cent of the employees were classified in this cluster.

The last cluster was characterized by the highest mean CP that they were subjected at least once a week to bullying at work (32%). The CP to be "never" subjected to negative acts was the lowest of all groups. We thus labelled this cluster as "victims." About 3% of the sample belonged to this cluster.

This LC analysis thus revealed that six instead of two clusters (victim/non-victim) were needed in order to classify exposure to bullying at work in a statistically valid way. These six clusters have high face validity. The validity of this LC solution, however, needs to be compared to the validity of the traditional operational classification method before conclusions can be drawn regarding the validity of the LC method.

Aim of the study

The present study aimed to analyse the validity of the six clusters identified with the LC procedure, compared to the validity of the dichotomized (i.e., bullied/not bullied) groups provided by the traditional operational classification method. The construct validity is examined by calculating the association between both objective methods (the operational classification method and the LC approach) and self-labelled bullying (subjective measure).

The predictive validity of the LC approach and the operational classification method are analysed by relating victim and non-victims groups derived from both methods to symptoms of stress (by means of correlations and analysis of variance). Since bullying at work is related to lower health and well-being among victims (Leymann & Gustafsson, 1996; Mikkelsen & Einarsen, 2001), the results of both the operational classification method and the LC approach should be associated with less favourable health and well-being outcomes: groups identified as targets of bullying will show lower well-being compared to non-exposed respondents (Hoel et al., 2004; Zapf et al., 1996). Moreover, we hypothesize that the LC approach will perform better in differentiating victims and non-victims, compared to the operational classification method.

Method

Sample

Data were collected from 6,175 respondents and originated from observations obtained from 18 Belgian organizations. A total of 57% of the respondents completed a Dutch and 43% a French questionnaire. The mean age of the respondents was 41 years ($SD = 10.7$). Whereas 48% of the sample stemmed from the private sector, 27% of the sample worked in public health organizations, and 25% in governmental institutions. The distribution of occupational groups was as follows: 9% blue collar workers, 31% white collar workers, 4% social worker, 13% nurses, 21% civil servants, 10% lower managerial, and 11% managerial positions. Gender was about equally distributed in the sample (52% male). A total of 78% of the respondents had a fixed term contract, 15% were on a temporary contract, and 7% had other types of contract (interim, subcontractor, or self-employed). This sample is not representative for the Belgian working population, due to the overrepresentation of white-collar workers. Although this does not interfere with the aims of our study, the results regarding the size of the clusters cannot be generalized to the Belgian working population.

Measurements

Exposure to bullying at work was measured by the NAQ (Einarsen & Raknes, 1997), translated by the first author into French and Dutch for use in Belgium. The rating categories of the 16 items in the Belgian NAQ were "never," "now and then," "once a month," and "once a week or more." The NAQ contains three types of negative acts: negative actions that target the role and/or work of the employee, negative actions targeting the person, and negative actions which aim to isolate the employee.

Three types of self-judgements of exposure to bullying were used. In nine organizations a single question was used, asking whether the respondent had been bullied at work ($n = 3,187$). The answering categories were "never," "sometimes," "often," and "always." In two organizations the respondents were asked whether they had been bullied at work during the last 6 months, using the same answering categories ($n = 980$). In four organizations, this question was preceded by a definition of bullying, originating from Belgian law.[1] Respondents were then asked whether they considered themselves as a victim of bullying ($n = 640$).

Symptoms of work stress were measured in 14 organizations, using the "Vragenlijst Beleving en Beoordeling van de Arbeid," a widely used and validated questionnaire (van Veldhoven & Meijman, 1994). A total of 38 items of this questionnaire were used, measuring four indictors of strain and well-being. The response alternatives were "yes" or "no." *Pleasure at work* was measured with 9 items, like "I dread going to work" (reversed coded) and "I'm pleased to start my day's work." Internal stability as measured by Cronbach's alpha was .84. *Need for recovery* ($\alpha = .88$) is based on 11 items (e.g. "I find it difficult to relax at the end of a working day" and "Because of my job, at the end of the working day I feel absolutely exhausted"). *Worrying* ($\alpha = .81$) was measured with four items: "When I leave my work, I continue to worry about work problems," and "I often lie awake at night pondering about things at work." *Sleep quality* ($\alpha = .90$) was measured with 14 items, such as "I often do not get a wink of sleep at night" and "At night, more often than not, I am tossing and turning."

Results

Construct validity

To assess the construct validity of the two alternative classification methods, we analyse their associations with self-judgements of exposure to workplace bullying (subjective method) by computing Spearman correlations. First, however, we compare the frequency of bullying across both classification methods. While the LC procedure showed 3% victims, 8% "work-related bullied," and 9% "sometimes bullied" respondents in the present sample, the OCM shows that 20.6% are to be regarded as victims, and 79.4% as non-victims. Table II provides more detailed information about the divergence of both methods.

Although both approaches classify some 20% of the sample as targets of workplace bullying, it is interesting to note that almost half of the respondents classified as victims according the OCM are classified as possible targets of workplace bullying by the LC solution, whereas almost 95% of respondents classified as victims according to the LC solution are also classified as a victim by the OCM. Compared to the LC approach, the OCM seems to overestimate the frequency of workplace bullying (20% victims following the OCM versus 3% victims according the LC classification). However, one could also

Table II. Comparison of the frequency of bullying across the two objective methods, latent class cluster analysis and the operational classification method (Leyman 1990a). (Total percentages).

	Clusters				
	Not bullied, Limited work criticism, Limited negative encounters	Sometimes bullied	Work-related bullied	Victim	Total
Operational classification method					
Not a victim of bullying	72.24	5.39	1.64	0.16	79.43
Victim of bullying	8.25	3.29	5.97	3.06	20.57
Total	80.49	8.68	7.61	3.22	100

argue that the LC approach offers a more differentiated view of the target group, by distinguishing the "targets" into three different groups ("victims," "work related bullied," "sometimes bullied") also totalling about 20%.

In Table III, the correlations between the cluster model and the different self-assessments of bullying are compared with the correlations between the OCM and the self-assessment (subjective) measures. All Spearman correlations reported are significant at the .001 level. There are some interesting differences, however. The Spearman correlations between the latent cluster approach and the first two subjective measures are significantly higher (i.e., .38 and .38) than the Spearman correlations between the OCM and these two subjective measures (i.e., .24 and .30) ($t = 11.19$, $df = 5657$, $p < .05$ and $t = 2.5$, $df = 894$, $p < .05$, respectively). No such difference is observed regarding the third subjective measure, in which the question was preceded by a definition of bullying. Although the latent cluster model shows the highest correlations, the associations between the latent cluster model and the subjective measures are not very high.

Predictive validity

To examine the predictive validity of both objective methods, LC and OCM, we analysed the associations of the latent clusters and the OCM classification with symptoms of stress at work (i.e., "pleasure at work," "need for recovery," "worrying," and "sleep quality"). First, Spearman correlations were calculated between the two objective methods and the outcome variables (Table IV). Next, an analysis of variance is performed. The mean standardized scores on the outcome variables for both objective methods are presented in Table V.

Table III. Associations between objective and subjective (self-assessment) measurements of bullying (Spearman correlations).

	Subjective methods		
	Are you bullied at work?	Have you been bullied at work during the last 6 months?	Belgian legal definition of bullying
Objective methods			
Operational classification method	.24	.30	.49
Latent class cluster method	.38	.38	.51

Note. All ps $< .001$.

Table IV. Associations between the two objective methods (latent class cluster analysis and the operational classification method) and various indicators of strain (Spearman correlations).

	Pleasure at work	Need for recovery	Worrying	Sleep quality
Operational classification method	−.28	.19	.17	−.20
Cluster method	−.30	.28	.21	−.29

Note. All ps <.01.

All correlations in Table IV are significant. This suggests that being a victim of bullying is associated with strains and being unwell as expected, regardless of the method used to decide whether one is a victim or not. The associations between the latent cluster model and the outcome variables are however significantly higher than the relationships between the OCM and all outcome variables (pleasure $t = 2.2$, $df = 4937$, $p < .05$; recovery need $t = 6.4$, $df = 4950$, $p < .05$; worrying $t = 3.5$, $df = 5023$, $p < .05$; and sleep quality $t = 6.4$, $df = 4912$, $p < .05$). The results in Table IV thus suggest that the latent cluster approach has a higher predictive validity than the operational classification method.

Table V shows the mean standardized scores (z-scores) on all outcome variables for all latent clusters and for both victims and non-victims according to the OCM. A negative mean score represents an unfavourable score on the outcome variable and a positive mean z-score a favourable position. After performing an analysis of variance, post-hoc multiple comparisons (pair wise Bonferonni tests) were administered.

The one-way analysis of variance shows that all results are significant. Hence, for both methods the between-groups variance is significantly higher than the within-groups variance. We start with the results of the OCM. The highest difference between victims and non-victims is achieved for pleasure at work (0.69 standard deviations). The lowest difference is noted for worrying (0.42 standard deviations). The results show a moderate increase of strains among the victims of bullying. Victims report less pleasure at work, lower sleep quality, more worrying, and a higher need for recovery after work.

The variation between the latent cluster categories regarding the outcome variables varies from 0.95 to 1.35. The mean z-scores of the victim cluster are quite low and reach −1 standard deviation, showing a 1.35 SD difference regarding pleasure at work compared to "not bullied" respondents. The results show that well-being and strain outcomes of the "not bullied" respondents are positive (+0.3 SD). As indicated by the Bonferonni pairwise comparisons, these scores are significantly more positive than the scores of the "limited work criticism" category. The "limited work criticism" category does not report problematic scores either, because they have a mean z-score of about 0 on all outcome variables. The "limited negative encounters" category reveals a similar pattern. Their mean z-score is significantly more negative regarding sleep quality only, when compared to the "limited work criticism" cluster. The mean z-scores of the "sometimes bullied" category are rather negative for all outcome variables. Compared to respondents in the "limited negative encounters" cluster, their score for pleasure at work is 0.3 SD lower, and scores for strains (like worrying and low sleep quality) are about 0.3 SD higher. The respondents in the "work-related bullying" cluster do not differ from the respondents of the "sometimes bullied" cluster on the strain-related outcomes (i.e., recovery need, worrying, and sleep quality). Their mean score for pleasure at work is more negative, however, indicating that these employees experience far less pleasure at work than the "sometimes bullied." The highest levels of strain were reported in the "victim" cluster. Victims did not sleep well, they worried a lot, and they did not recover well after work. Additionally, they did not experience

Table V. Comparison of the mean scores of the clusters on four work outcomes (z-values), as obtained with latent cluster analysis and the operational classification method, against indicators of strain.

	Latent cluster method							Operational classification method		
	Clusters									
	Not bullied	Limited work criticism	Limited negative encounters	Sometimes bullied	Work-related bullied	Victim	F^1	Not a victim of bullying	Victim of bullying	F^2
Pleasure at work	0.32	0.02[a]	0.07[a]	−0.37	−0.62	−1.03	128.9	0.16	−0.53	454.8
Recovery need	0.31	−0.00[a]	0.01[a]	−0.44[b]	−0.45[b]	−0.88	104.2	0.11	−0.36	191.8
Worrying	0.23	0.00[a]	0.00[a]	−0.35[b]	−0.38[b]	−0.72	61.8	0.09	−0.33	154.1
Sleep quality	0.29	0.06	−0.11	−0.45[a]	−0.37[a]	−1.01	104.2	0.11	−0.37	203.3

[1]All F-values have 5 df for the factor and at least 909 df for the error term, all ps $<.001$.
[2]All F-values have 1 df for the factor and at least 4904 df for the error term, all ps $<.001$.
Note. Identical superscripts (a, b) indicate that the pairs of means are not significantly different. Means with no identical superscripts differ significantly from each other, $p < .001$.

much pleasure at work. The Bonferonni tests show that victims differed from all other groups, including the "work related bullying" cluster.

The comparison of the two classification methods reveals a larger range on the four outcome measures for the LC method compared to the OCM. Hence, victims in the LC model differed more from non-victims, than did victims and non-victims based on the OCM. This could partly be due to the fact that the operational method only differentiates between two groups, whereas the latent cluster approach distinguishes six clusters. However, the figures in Table IV show that the OCM does not differentiate as strongly as the LC model. A comparison of the mean scores of the victim group of the OCM with those of the "sometimes bullied" or the "work-related bullying" clusters from the LC method reveals similar scores. The victim group in the LC approach reports strong negative strains (-1 SD), whereas the victims in the OCM only report moderate strains (-0.5 SD). This suggests that the LC approach performs better in differentiating "true" victims of bullying. Taken together, these results suggest that the LC approach shows more predictive validity than the OCM.

Discussion

The aim of the present study was to investigate and compare the validity of two different methods of estimating the prevalence of workplace bullying: a latent class analyses and the often-used operational criteria (e.g., operational classification method) put forward by Leymann (1990a). Both methods are based on responses to inventories measuring exposure to different kinds of bullying behaviours (objective method). Although single acts of aggressive behaviours may be prevalent in working life and be something that many workers may experience from time to time, they may constitute bullying and could become a major health threat when occurring frequently over a longer period of time.

In line with existing theories (Björkqvist, 1992; Einarsen, 1999), the latent class cluster (LC) approach to estimating exposure to workplace bullying using the NAQ shows that there are different and distinct groups of employees concerning exposure to bullying at work (see also Notelaers et al., 2006). While large groups of respondents report no or hardly any exposure to any kind of bullying, others systematically report exposure to a wide range of such behaviours. However, this group of potential targets forms three distinct groups, which differ both in terms of frequency and nature of the reported bullying.

The results of the analysis of the predictive validity of the LC approach support the existence of six distinctive groups among the studied population. The more frequent was the exposure to several types of bullying behaviours, the more strain was reported. Respondents that were "not bullied" reported an elevated level of pleasure at work, a low level of need for recovery, a low level of worrying, and a high level on quality of sleep. Those respondents who only experienced limited work-related criticism reported neither negative nor positive symptoms of strain. Respondents experiencing only limited negative encounters reported a decrease of their quality of sleep. Infrequent exposure to many different kinds of negative acts, as is evident in the "sometimes bullied" cluster, were however related to a decrease in pleasure at work and an increase in measures of tension. This was also the case for those respondents who reported some work-related negative acts. This cluster reported an even lower pleasure at work. The victims cluster is the only group where negative z-values of -1 were found for potential outcomes, such as lack of pleasure at work and work-related distress. This result is close to the threshold observed by Zapf and colleagues (1996) when employing data from self-identified victims groups.

The OCM implicitly assumes that there exist only two groups of respondents. Hence, in our study the OCM estimated almost 7 times more victims of workplace bullying than the LC method (20% versus 3%). Additionally, it does not allow researchers to differentiate potential target groups. Moreover, when these two groups are related to the outcomes in this study, it was shown that the difference between the groups approximates 0.6 standard deviations. This difference that is far below the difference Zapf et al. (1996) observed, indicating that the predictive validity of the OCM is not high.

The difference between the two classifications methods is not so obvious when the correlations between both methods and self-assessment measures are calculated. However, the correlations between the latent clusters and two self-assessment measures ("have you been bullied at work" and "have you been bullied at work during the last 6 months") was significantly higher than the corresponding correlations of the OCM.

Practical implications

Interventions against bullying at work are often based on a generally accepted estimate of the prevalence of bullying in the organization. In this respect, a pure self-labelling approach may often be questioned, and a need for more objective estimates could arise. Two such objective approaches have been presented and investigated in the present paper, with the LC procedure having been found to be the most valid. Furthermore, a tailored intervention programme against bullying will often be in need of information that provides finer distinctions on both the frequency and the nature of bullying, a requirement that again will be best met by using the LC approach. Inspecting the mean standardized scores of the clusters may assist interventionists to adequately apply the hierarchy of intervention measures: informing about bullying at work, preventing bullying at work, and assisting victims of workplace bullying. The results indicate that the first three clusters that we obtained did not experience much distress at work. Hence, informing these respondents about how bullying affects people and the social climate, and communicating a policy that workplace bullying is not tolerated in the organization, may be sufficient to prevent workplace bullying. Informing employees may no longer be sufficient for respondents that are sometimes bullied, as they experience lack of pleasure at work and elevated level of strains. For those respondents, analysing the causes of bullying may be necessary to counteract workplace bullying. In some cases, individual counselling may be needed to deal with the problem. Since work-related bullied respondents are characterized by a high exposure to work-related negative acts, analysing the work environment may contribute to the explanation of their bullying experience. Identifying the risk factors at the organizational level and the individual level might assist counsellors with the development of interventions to counteract their appreciation of not being valued at the workplace. That the well-being of victims is seriously affected could imply that informing and analysing the work environment may be too little, too late. Therefore, those individuals need assistance to be able to deal with their experience of being a victim of workplace bullying. However, from the preventive point of view, an analysis of the organization to identify the risk factors responsible for the occurrence of workplace bullying may yield intervention paths to prevent workplace bullying in the future. Furthermore, communicating and installing a zero tolerance policy might prevent current and future perpetrators from bullying others.

Methodological reflections

The present study is based on a selection of organizations in Belgium. Hence, the results regarding the frequency of bullying are not representative for Belgium as such. The cross-sectional nature of the survey data does not allow for causal interpretations of the observed relationships between exposure to bullying and lack of well-being. Furthermore, although it may be tempting to interpret the results of the LC analysis as support for a stage model of bullying in which bullying is conceived of as an escalating process, the data do not allow testing such an interpretation. The present data cannot prove that the "sometimes bullied" or the "limited negative encounters" groups have a higher probability of becoming victims, compared to the "not bullied" cluster. The process of bullying cannot be modelled statistically using the present cross-sectional data. To do so, large-scale longitudinal research is needed. Longitudinal studies would enable the analysis of the stability of the LC groups over time and would enable to examine whether respondents change from one cluster to another.

Note

1 Belgian law defines bullying at work as comprising "any illegitimate and recurrent behaviour, within or outside an enterprise or institution, than can manifest itself in the form of behaviour, verbal aggression, threats, gestures and unilateral writings. It is aimed at, or has as a consequence, that the personality, the dignity or the physical or psychological integrity of an employee (or any other person to whom the law can be applied) is harmed during labour, that his position is jeopardized or that an atmosphere is created that can be labelled as threatening, hostile, offensive, or humiliating." (Translation by the present authors of the definition in the law of 11 June 2002, concerning protection against violence, bullying, and sexual harassment. [*Wet van 11 juni 2002 betreffende de bescherming tegen geweld, pesterijen en ongewenst seksueel gedrag op het werk*]).

References

Agervold, M., & Mikkelsen, E. (2004). Relationships between bullying, psychosocial work environment and individual stress reactions. *Work & Stress*, *18*, 336–351.

Baillien, E., Neyens, I., Notelaers, G., & De Witte, H. (2006, June). *Risk analysis tool for workplace bullying*. Poster session presented at the Fifth International Conference on Workplace Bullying: "Workplace Bullying—The Way Forward."

Björkqvist, K. (1992). Trakassering förekommer bland anstallda vid Abo Akademia. [Harassment among employees at Abo Academy]. *Meddelande fran Abo Akademi*, *9*, 27–33.

Björkqvist, K., Österman, K., & Hjelt-Bäck, M. (1994). Aggression among university employees. *Aggressive Behavior*, *20*, 173–184.

Einarsen, S. (1999). The nature and causes of bullying at work. *Journal of Manpower*, *20*, 16–27.

Einarsen, S. (2000a). Harassment and bullying at work: A review of the Scandinavian approach. *Aggression and Violent Behavior*, *5*, 379–401.

Einarsen, S. (2000b, September). Bullying and harassment at work: Unveiling an organizational taboo. In M. Sheehan, S. Ramsey, & J. Partick (Eds.), *Transcending boundaries. Integrating people*. Proceedings of the 2000 Conference, Brisbane, Griffith University, Brisbane, Australia.

Einarsen, S., & Hoel, H. (2001, May). *The validity and development of the Revised Negative Acts Questionnaire*. Paper presented at the European Congress of Work and Organizational Psychology, Prague.

Einarsen, S., & Hoel, H. (2004, June). *Measuring workplace bullying with the NAQ*. Workshop at the Fourth International Conference on Bullying and Harassment in the workplace, Bergen, Norway.

Einarsen, S., Hoel, H., Zapf, D., & Cooper, C. L. (2003). The concept of bullying at work. The European tradition. In S. Einarsen, H. Hoel, D. Zapf, & C. L. Cooper (Eds.), *Bullying and emotional abuse in the workplace. International perspectives in research and practice* (pp. 3–30). London: Taylor & Francis.

Einarsen, S., & Raknes, B. (1997). Harassment in the workplace and the victimization of men. *Violence and Victims*, *12*, 247–263.

Frese, M., & Zapf, D. (1988). Methodological issues in the study of work stress. In C. L. Cooper, & R. Payne (Eds.), *Causes, coping and consequences of stress at work* (pp. 375–411). Chichester: Wiley.

Hoel, H., Faragher, B., & Cooper, C. L. (2004). Bullying is detrimental to health, but all bullying behaviours are not necessarily equally damaging. *British Journal of Guidance & Counselling*, 32, 367–387.

Hoel, H., Rayner, C., & Cooper, C. L. (1999). Workplace bullying. In C. L. Cooper, & I. I. Robertson (Eds.), *International Review of Industrial and Organisational Psychology* (pp. 195–230). Chichester: John Wiley & Sons Ltd.

Leymann, H. (1990a). Mobbing and psychological terror at workplaces. *Violence and Victims*, 5, 119–126.

Leymann, H. (1990b). *Manual of the LIPT questionnaire for assessing the risk of psychological violence at work*. Stockholm: Violen.

Leymann, H., & Gustafsson, A. (1996). Mobbing at work and the development of post-traumatic stress disorders. *European Journal of Work and Organizational Psychology*, 5, 251–275.

Magidson, J., & Vermunt, J. K. (2002). Latent class modelling as a probabilistic extension of K-means clustering. *Quirk's Marketing Research Review March*, 20, 77–80.

Magidson, J., & Vermunt, J. K. (2004). Latent class models. In D. Kaplan (Ed.), *The Sage Handbook for Quantitative Methodology* (pp. 175–198). Thousand Oakes, CA: Sage Publications.

Matthiesen, S. B., Raknes, B. I., & Røkkum, O. (1989). Mobbing på arbeidsplassen [Bullying at the workplace]. *Tidsskrift for Norsk Psykologforening*, 26, 761–774.

Mikkelsen, E., & Einarsen, S. (2001). Bullying in Danish work-life: Prevalence and health correlates. *European Journal of Work and Organizational Psychology*, 10, 393–413.

Mikkelsen, E., & Einarsen, S. (2002). Relationships between exposure to bullying at work and psychological and psychosomatic health complaints: The role of state negative affectivity and generalized self-efficacy. *Scandinavian Journal of Psychology*, 43, 397–405.

Notelaers, G., & De Witte, H. (2003). Pesten op het werk: omvang en welke gedragingen? [Bullying at work: Frequency and negative acts involved]. *Over.Werk, Tijdschrift van het Steunpunt Werkgelegenheid Arbeid en Vorming*, 4, 165–169.

Notelaers, G., De Witte, H., Vermunt, J. K., & Einarsen, S. (2006). Pesten op het werk, gewikt en gewogen. Een latente-klassenbenadering op basis van de Negative Acts-vragenlijst [Bullying at work. A latent cluster analysis of the Negative Acts Questionnaire]. *Gedrag & Organisatie*, 2, 141–161.

Salin, D. (2001). Prevalence and forms of bullying among business professionals: A comparison of two different strategies for measuring bullying. *European Journal of Work and Organizational Psychology*, 10, 425–441.

van Veldhoven, M., & Meijman, T. F. (1994). *Het meten van psychosociale arbeidsbelasting met een vragenlijst: de vragenlijst beleving en beoordeling van de arbeid (VBBA)* [Measuring psychosocial demands with a questionnaire: the VBBA]. Amsterdam: NIA.

Vartia, M. (1996). The sources of bullying: Psychological work environment and organizational climate. *European Journal of Work and Organizational Psychology*, 5, 201–215.

Vermunt, J. K., & Magidson, J. (2002). Latent class cluster analysis. In J. A. Hagenaars, & A. L. McCutcheon (Eds.), *Applied latent class analysis* (pp. 89–106). Cambridge: Cambridge University Press.

Zapf, D., & Einarsen, S. (2003). Individual antecedents of bullying: Victims and perpetrators. In S. Einarsen, H. Hoel, D. Zapf, & C. L. Cooper (Eds.), *Bullying and emotional abuse in the workplace. International perspectives in research and practice* (pp. 165–184). London: Taylor & Francis.

Zapf, D., Einarsen, S., Hoel, H., & Vartia, M. (2003). Empirical findings on bullying in the workplace. In S. Einarsen, H. Hoel, D. Zapf, & C. L. Cooper (Eds.), *Bullying and emotional abuse in the workplace. International perspectives in research and practice* (pp. 103–126). London: Taylor & Francis.

Zapf, D., Knorz, C., & Kulla, M. (1996). On the relationship between mobbing factors, and job content, social work environment, and health outcomes. *European Journal of Work and Organizational Psychology*, 5, 215–237.