Derivation of a Shortened Research Instrument for Measuring Alcohol and Other Drug (AOD) Attitudes in a Screening, Brief Intervention, and Referral to Treatment (SBIRT) Training Program

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ABSTRACT

The Alcohol and Alcohol Problems Perception Questionnaire (AAPPQ) is a survey for evaluating the attitudes of clinicians towards patients with alcohol use disorders. A locally-developed research instrument for a Screening, Brief Intervention, and Referral to Treatment (SBIRT) training program, the Survey of Attitudes and Perceptions, incorporates the AAPPQ to measure changes in the attitudes of healthcare professionals pre- and post-training. To ease the burden of the research instrument, a derivation study was undertaken using Principal Component Analysis (PCA) to derive fewer statements from each factor of the AAPPQ. The original 30-statement AAPPQ was reduced to 13 statements, representing the six factors of the AAPPQ and showing qualities of coherence, non-redundancy, and reliability. The 13 corresponding Drug and Drug Problems Perceptions Questionnaire were also included in the revised SAP instrument.

INTRODUCTION

Patient misuse of alcohol and other drugs (AOD)[1] is associated with poorer medication adherence, increased traumatic injury, worse prognosis for many chronic illnesses (McLellan, Lewis, O'Brien, & Kleber, 2000), and heightened healthcare costs (Mertens, Weisner, Ray, Fireman, & Walsh, 2005). Given these public health and economic consequences, it is important to identify and engage these patients in discussions about their alcohol or substance use.

Screening, Brief Intervention, and Referral to Treatment (SBIRT) is an evidence-based practice demonstrated to significantly reduce patient alcohol and drug misuse (Madras et al., 2009). Furthermore, SBIRT for unhealthy alcohol use has been shown to be a cost-effective medical preventive service (Solberg, Maciosek, & Edwards, 2008). However, physicians often lack adequate knowledge and skills about SBIRT (O'Connor, Nyquist, & McLellan, 2011). In response to this gap, specialized SBIRT training programs were developed for emergency medicine (Bernstein et al., 2007), primary care (Tanner, Wilhelm, Rossie, & Metcalf, 2012), family medicine (Seale, Shellenberger, & Clark, 2010), pediatrics (Ryan et al., 2012), and multi-disciplinary programs aimed at improving healthcare professionals' SBIRT competence and AOD attitudes, knowledge, and skills (Clemence et al., 2015; Scott et al., 2012; Tetrault et al., 2012). A challenge that comes with these training programs is adequately measuring trainees' attitudes and perceptions regarding working with patients with alcohol and drug-related problems.

Two instruments developed to assess healthcare professionals' attitudes towards working with patients with AOD-related problems are the *Alcohol and Alcohol Problems Perception Questionnaire* (AAPPQ) (Cartwright, 1980) and the *Drug and Drug Problems Perception Questionnaire (DDPPQ)* (Watson, Maclaren, & Kerr, 2007). The original AAPPQ and DDPPQ each feature 30 statements, such as "*I feel I have a working knowledge of alcohol and alcohol related problems"* and *"I feel I have the right to ask patients/clients questions about their drug use when necessary."* Respondents rate each statement on a seven-point Likert scale (1 – strongly agree; 7 – strongly disagree). The resulting score provides a measure of the likelihood

[1] Abbreviations:
AAPPQ – Alcohol and Alcohol Problems Perception Questionnaire
DDPPQ – Drug and Drug Problems Perception Questionnaire
AOD – Alcohol and other drugs
SAP – Survey of Attitudes and Perceptions
SBIRT – Screening, Brief Intervention, and Referral to Treatment
PCA – Principal Component Analysis
SAAPPQ – Shortened Alcohol and Alcohol Problems Perception Questionnaire

that respondents will engage people with AOD disorders during medical care. While these instruments, and others, are widely used, they are long and therefore challenging to administer as survey fatigue is common (Harris et al., 2012; Rees et al., 2011).

In this study, we present the development of an instrument titled the *Survey of Attitudes and Perceptions (SAP).* An initial version of the SAP instrument was comprised of a total of 77 items, including 30 AAPPQ items, and 7 DDPPQ items. Due to its length, the researchers feared the SAP instrument would lead to respondent fatigue, inhibiting completion of the surveys in their entirety and discouraging future trainees from engaging with the SBIRT training program and its research. Therefore, the goal of this study was to mitigate possible survey fatigue by reducing the length of the SAP. This was accomplished by selecting and including a number of AAPPQ and DDPPQ items that reduced the SAP's overall length while maintaining the most important characteristics of the AAPPQ and DDPPQ subcomponents.

METHODS

The setting for this derivation study was a university-based SBIRT training program. The University of Pittsburgh Institutional Review Board approved evaluation of this training program.

The SAP's 77 items asked respondents about their demographics, previous AOD education, how frequently they used AOD knowledge and skills in their work, as well as questions about their current knowledge, skills, and attitudes regarding AOD treatment and intervention. Of these 77 items, 30 AAPPQ statements and 7 DDPPQ statements were included. Principal component analysis (PCA) was used to analyze and select which AAPPQ statements to include in the revised SAP instrument. Then the corresponding DDPPQ items were also included in the revised instrument. The following will detail the results of the PCAs for the AAPPQ items.

Six factors previously identified by Cartwright (Gorman & Cartwright, 1991) in the AAPPQ as conceptually associated with a particular factor were the starting place for analysis: Role Adequacy, Role Legitimacy, Role Support, Task-Specific Self-Esteem, Motivation, and Satisfaction. PCA was the appropriate statistical test in this derivation study because, rather than randomly selecting which statements to keep and which to remove, this technique retained the statements that provided the most information within each factor of the AAPPQ (I. Jolliffe, 2002). Table 1 details the AAPPQ and DDPPQ statements included in the original SAP instrument, grouped by each of the six factors.

Table 1. AAPPQ and DDPPQ statements included in the original SAP instrument		
AAPPQ Statements		**DDPPQ Statements**
Factor 1. Role Adequacy		
A	I feel I have a working knowledge of alcohol and alcohol-related problems.	I feel I have a working knowledge of drug and drug-related problems.
B	I feel I know enough about the causes of drinking problems to carry out my role when working with drinkers.	-
C	I feel I know enough about alcohol dependence syndrome to carry out my role when working with drinkers.	-
D	I feel I know enough about the psychological effects of alcohol to carry out my role when working with drinkers.	-
E	I feel I know enough about the factors which put people at risk of developing drinking problems to carry out my role when working with drinkers.	-
F	I feel I know how to counsel drinkers over the long term.	-
G	I feel I can appropriately advise my patients about drinking and its effects.	I feel I can appropriately advise my patients about drugs and their effects.
Factor 2. Role Legitimacy		
H	I feel I have a clear idea of my responsibilities in helping drinkers.	-
I	I feel I have the right to ask patients about their drinking when necessary.	I feel I have the right to ask patients about their drug use when necessary.
J	I feel that my patients believe I have the right to ask them questions about drinking when necessary.	-
K	I feel I have the right to ask a patient for any information that is relevant to their drinking problem.	-
Factor 3. Role Support		
L	If I felt the need when working with drinkers, I could easily find someone with whom I could discuss any personal difficulties that I might encounter.	-
M	If I felt the need when working with drinkers, I could easily find someone who would help me clarify my professional responsibilities.	-

Table 1. AAPPQ and DDPPQ statements included in the original SAP instrument		
AAPPQ Statements		**DDPPQ Statements**
N	If I felt the need, I could easily find someone who would be able to help me formulate the best approach to a drinker.	If I felt the need, I could easily find someone who would be able to help me formulate the best approach to a drug user.
Factor 4. Motivation		
O	I am interested in the nature of alcohol-related problems and the responses that can be made to them.	-
P	I want to work with drinkers.	I want to work with drug users.
Q	I feel that the best I personally can offer drinkers is referral to somebody else.	-
R	I feel that there is little I can do to help drinkers.	-
S	Pessimism is the most realistic attitude to take toward drinkers.	-
Factor 5. Task-Specific Self-Esteem (Negative[1] and Positive[2])		
T	I feel I am able to work with drinkers as well as others.[2]	-
U	All in all, I am inclined to feel I am a failure with drinkers.[1]	-
V	I wish I could have more respect for the way I work with drinkers.[1]	-
W	I feel I do not have much to be proud of when working with drinkers.[1]	-
X	At times, I feel I am no good at all with drinkers.[1]	-
Y	On the whole, I am satisfied with the way I work with drinkers.[2]	On the whole, I am satisfied with the way I work with drug users.[2]
Factor 6. Satisfaction		
Z	I often feel uncomfortable when working with drinkers.	-
AA	In general, one can get satisfaction from working with drinkers.	-
BB	In general, it is rewarding to work with drinkers.	In general, it is rewarding to work with drug users.
CC	In general, I feel I can understand drinkers.	-
DD	In general, I like drinkers.	-

There were three statistical methodologies utilized for the PCA, including Loading (coherence), Uniqueness (non-redundancy), and Cronbach's Alpha (reliability). For the first statistic, statements have a high loading value when they explain a large portion of the variance of a factor and are deemed relevant to the factor, while other statements that do not explain as much variance are not as relevant. Loadings closer to one are preferable. Uniqueness explains how a statement or group of statements is similar or dissimilar to another. If a group of statements have high uniqueness values, then they are not similar to each other or to other statements in the factor. Cronbach's alpha (Cronbach, 1951) is a common measure of scale reliability, in other words, how closely a set of statements in a group are related. An acceptable Cronbach's alpha score is approximately 0.7.

Data utilized for this derivation study included pre- and post-training survey responses of 197 SBIRT trainees, including medical residents (54), nursing students (38), and medical students (105). The PCA process involved assembling different combinations of statements until there were six adequately reduced factors based on the statistics described in the methods section above. Within a factor, a PCA analysis was performed on all of the AAPPQ statements at first. Then, different combinations of statements were assembled, and PCA was performed on those combinations. The three statistics were examined for each combination, and the best combinations based on the results were retained for the final instrument. In borderline cases where PCA yielded multiple appropriately balanced statements, the research team chose to retain the statements that also had a corresponding DDPPQ statement as part of the original SAP instrument in order to retain drug-specific assessment as well. The management of survey data and the PCA analysis was performed using the statistical program SPSS, Version 22.

RESULTS

Combinations of statements within each factor were analyzed, resulting in statements that best satisfied the qualities within each factor (Table 2).

Role Adequacy

For the first factor, statements A and F loaded highly, had high uniqueness values, and had an acceptable Cronbach's alpha (0.85). Statement G was also retained as it was part of the DDPPQ set of statements in the original SAP instrument. Thus, statements A, F, and G were all retained for the final instrument.

Role Legitimacy

Statements I and J loaded highly in the Role Legitimacy factor and had acceptable uniqueness and reliability values, thus both were retained for the final instrument.

Role Support

Although statements L and N loaded highly, there were uniqueness problems. All other combinations of Role Support statements (L, M, and N) followed a similar pattern. In other words, all three statements were non-unique. The two scores may have such high reliability because they are non-unique. Therefore, only N was retained due to its inclusion in the DDPPQ statement set in the original SAP instrument.

Motivation

Statements O and P were selected because of high loadings and acceptable uniqueness and reliability values of similar magnitude to those for the Role Legitimacy statements (Items I and J).

Task-Specific Self-Esteem

This factor is unique in that there are a number of negatively-phrased statements (e.g., *"All in all, I am inclined to feel I am a failure with drinkers*"). For these statements, strongly disagreeing with a negatively-phrased statement corresponds to strongly agreeing with a positively-phrased statement. In order to capture variance, this factor was divided into "negative self-esteem" and "positive self-esteem" statements. The negatively-phrased statements U and W were retained as they loaded high and were unique. Statement T was dropped because it did not have a high enough loading. Statement Y was retained as the only "positive self-esteem" statement because it was one of the DDPPQ statements in the original instrument. Therefore, the revised set for the Task-Specific Self-Esteem factor included one positively-phrased (statement Y) and two negatively-phrased statements (statements U and W).

Satisfaction

Statements BB and DD loaded highly and had a good Cronbach's alpha, making them appropriate choices.

Table 2. AAPPQ statements considered in the PCA analysis and their corresponding loading, uniqueness, and reliability results.

AAPPQ Item	**Loadings[1]**	**Uniqueness[2]**	**Reliability[3]**
Factor 1: Role Adequacy			
A. I feel I have a working knowledge of alcohol and alcohol-related problems.	0.820	0.328	0.85

Table 2. AAPPQ statements considered in the PCA analysis and their corresponding loading, uniqueness, and reliability results.			
AAPPQ Item	**Loadings[1]**	**Uniqueness[2]**	**Reliability[3]**
F. I feel I know how to counsel drinkers over the long term.	0.723	0.477	
G. I feel I can appropriately advise my patients about drinking and its effects.	0.912	0.169	
Factor 2: Role Legitimacy			
I. I feel I have the right to ask patients about their drinking when necessary.	0.733	0.463	0.68
J. I feel that my patients believe I have the right to ask them questions about their drinking when necessary.	0.733	0.463	
Factor 3: Role Support			
L. If I felt the need when working with drinkers, I could easily find someone with whom I could discuss any personal difficulties I might encounter.*	0.900	0.191	0.88
N. If I felt the need I could easily find someone who would be able to help me formulate the best approach to a drinker.	0.900	0.191	
Factor 4: Motivation			
O. I am interested in the nature of alcohol-related problems and the responses that can be made to them.	0.733	0.463	0.68
P. I want to work with drinkers.	0.733	0.463	
Factor 5: Task-Specific Self-Esteem (Negative)			
U. All in all, I am inclined to feel I am a failure with drinkers.	0.702	0.507	0.64
W. I feel I do not have much to be proud of when working with drinkers.	0.702	0.507	
Factor 5: Task-Specific Self-Esteem (Positive)			
Y. On the whole, I am satisfied with the way I work with drinkers.**	-	-	-
Factor 6: Satisfaction			
BB. In general, it is rewarding to work with drinkers.	0.829	0.313	0.77
DD. In general, I like drinkers.	0.829	0.313	

[1] Measured on a 0-1 scale; a value closer to one means that the questions explain a large portion of variance.

[2] Measured on a 0-1 scale; a value closer to one means that the questions are not redundant.

[3] Acceptance range of approximately 0.7 to 0.8.

Table 2. AAPPQ statements considered in the PCA analysis and their corresponding loading, uniqueness, and reliability results.			
AAPPQ Item	**Loadings[1]**	**Uniqueness[2]**	**Reliability[3]**
*L not included in the final instrument because of uniqueness issues. **Y included in the final instrument because it was one of the original DDPPQ statements.			

Based on the above results, the SAP instrument was reduced from 30 AAPPQ statements to 13 AAPPQ, including statements A, F, G, I, J, N, O, P, U, W, Y, BB, and DD. However, in order to maintain the benefits and characteristics of the parallel DDPPQ, the 13 parallel DDPPQ statements were also included in the revised SAP instrument. While this meant increasing the number of DDPPQ statements from the original version (seven statements to 13) the result was still an overall shorter instrument of 66 items instead of 77 items.

DISCUSSION

The result of this derivation study was a shorter instrument (66 items rather than 77), that demonstrated reasonable validity using PCA (I. T. Jolliffe, 1972; I. Jolliffe, 2002). This instrument could be beneficial for future research studies in healthcare, including those on SBIRT, which have cited survey fatigue as a limitation to collecting and reporting complete and substantive data (Harris et al., 2012; Rees et al., 2011). While surveys may be necessary for quality improvement and can be used to indicate innovation fidelity, it is important to ensure that the surveys themselves do not hinder learning, implementation, or program sustainability. Future SBIRT program administrators, and associated funding agencies (Substance Abuse and Mental Health Services Administration, 2008) should be cognizant of the data collection and reporting they require for trainees, patients, and programs so that these components do not hinder the dissemination of needed healthcare practices.

A condensed version of the AAPPQ (the SAAPPQ) was constructed previously by Anderson and Clement (Anderson & Clement, 1987) that contains 10 statements from the original AAPPQ (B, G, I, J, P, S, U, W, BB, and DD). The reduction was based on the responses of 312 British General Practitioners in 1987, a very different population from the healthcare professional trainees typical of present-day SBIRT training programs. Therefore, the researchers did not use this version and instead applied an empirical methodology to condense the AAPPQ statement set. However, the set of AAPPQ statements in the SAP instrument are fairly similar to Anderson and Clement's SAAPPQ. The SAP contains statements G, I, J, P, U, W, BB, and DD as in the SAAPPQ, plus statements A, F, N, O, and Y not contained in the SAAPPQ.

Also, Anderson and Clement's analyses focused on reductions within the entire questionnaire, while the current derivation study focused on reductions within the six individual factors. This approach was supported by Gorman and Cartwright (Gorman & Cartwright, 1991), who have noted that the theory underlying the questionnaire suggests treating different factors as distinct. Therefore, survey responses were reported by the average response to each factor rather than a total score. The resulting condensed set of AAPPQ statements and parallel DDPPQ statements in the research instrument (26 items total) ensured that the new factors were consistent with the larger survey's theoretical underpinning and captured a maximum amount of information.

Limitations

A point of potential difficulty for deriving a final set of statements was that there was a trade-off between the *coherence* (loading) and *non-redundancy* (uniqueness) of a given factor. A factor consisting of three repetitions of the exact same statement would have near-perfect coherence while being completely redundant. A factor consisting of three completely unrelated statements would have no coherence, but no redundancy either. This issue was present in our data, such as with statements L, M, and N, but in general, the final statements had adequate uniqueness and loadings, and neither quality limited the items included in the final instrument.

Future study is recommended to formally validate the SAP's psychometric properties with SBIRT training programs. A panel of experts and content validity indices could help provide this validity (Polit & Beck, 2006). Additionally, future studies could take advantage of reducing the original SAP instrument (or reducing the revised SAP instrument further) using methods such as item response theory (Drasgow & Hulin, 1990; Embretson & Reise, 2013), exploratory factor analysis (Cudeck, 2000), or confirmatory factor analysis (Harrington, 2009).

Revised DDPPQ

Upon examination of the condensed set of AAPPQ statements, there was concern that the length of the AAPPQ statement set was still greater than the length of the DDPPQ statement set (13 AAPPQ statements compared to 7 DDPPQ statements). To retain consistency and benefits from the parallel DDPPQ, the same statements in the DDPPQ as in the condensed AAPPQ were included in the revised SAP instrument. Thus, the final revised SAP instrument contained 13 AAPPQ statements and 13 DDPPQ statements.

Conclusions

Survey fatigue is a common problem when conducting survey evaluation of healthcare education programs. The result of this derivation study was a shorter and theoretically valid research instrument. Future study is recommended to formally validate the SAP's psychometric properties within the SBIRT training program and with external SBIRT training programs.

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Dr. Pringle is an epidemiologist by training, with extensive experience in health services research. She is a Professor at the University of Pittsburgh, School of Pharmacy, and the founder and Director of the Program Evaluation Research Unit (PERU) within the University of Pittsburgh, School of Pharmacy. Her area of expertise is health services research and organizational health, especially as it relates to healthcare innovation implementation. She has conducted numerous health services research studies and program evaluation efforts involving (but not limited to): screening, brief intervention and referral to treatment (SBIRT), innovative addiction treatment approaches, chronic disease intervention and prevention models, medication adherence interventions, and patient access to care improvement efforts. She has also developed a framework for assessing organizational health and guiding systems transformation, which has been used with the Veterans Health Administration, primary care practices, and Integrated Care practices, among other health care sites and entities. Additionally, she is the Co-Chair of the Pennsylvania Department of Drug and Alcohol Program's Clinical Standards Committee. Throughout her career, Dr. Pringle has secured over $140 million in grants from a variety of sources, and she has developed healthcare policy research and briefs that have been used to inform policy development at both the state and federal level.