A cross-sectional survey of health risk behaviour clusters among a sample of socially disadvantaged Australian welfare recipients

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ABSTRACT

Objective: Despite increasing evidence that health risk behaviours cluster together, no studies have examined patterns of health risk amongst severely disadvantaged groups. This study aimed to examine the prevalence and clustering of six health risk behaviours (smoking, alcohol, inadequate sun protection, physical inactivity, and inadequate fruit and vegetable consumption) among severely disadvantaged individuals.

Methods: A cross-sectional touch screen computer survey was conducted with 383 clients attending a social and community welfare organisation in New South Wales, Australia. Participants completed standardised measures assessing smoking status, alcohol consumption, fruit and vegetable consumption, physical activity, sun protection and socio-demographic characteristics. Descriptive statistics, factor analysis and logistic regression were used to assess the prevalence, clustering and socio-demographic predictors of health risk behaviours.

Results: Ninety eight percent of participants reported inadequate vegetable consumption, 62.7% reported inadequate fruit consumption, 82.5% reported inadequate sun protection, 61.7% smoked tobacco, 51.4% consumed alcohol at risky levels and 36.5% were insufficiently active. Most participants (87%) reported three or more risk behaviours. Factor analysis revealed that smoking and alcohol consumption clustered together, and physical inactivity and inadequate fruit and vegetable consumption clustered together. Male participants, younger participants and those with lower education were more likely to smoke and consume alcohol.

Conclusions: The prevalence of single and multiple health risk behaviours among a sample of typically hard-to-reach severely disadvantaged individuals is extremely high.

Implications: Future intervention development should take into account the likelihood of health risk clustering among severely disadvantaged groups.

INTRODUCTION

Health risk behaviours such as tobacco smoking, poor nutrition, physical inactivity, and excessive alcohol consumption account for the majority of preventable causes of death worldwide[1] There is mounting evidence that unhealthy behaviours often occur simultaneously or in "clusters", increasing risk of disease[2-12] For example, Poortinga et al (2007) found that over 70% of a general population sample with one unhealthy risk behaviour also displayed at least one other[11] Despite this growing evidence, public health initiatives in most countries continue to target one behaviour at a time. Identifying which unhealthy behaviours occur simultaneously within certain population groups can help inform the development of interventions targeting multiple behaviours, with potentially large gains for individual and population health.

While some studies have reported a link between multiple health behaviour clusters and socioeconomic status[11-14] few studies have examined the patterns of health risk behaviours amongst severely socioeconomically disadvantaged groups that suffer from multiple forms of social and financial disadvantage. One such study with non-Hispanic white, non-Hispanic black and Mexican American participants found that each group reported unique patterns of clustering among unhealthy behaviours[15] In another study using factor analyses to examine clusters of health behaviours amongst immigrants to the Netherlands, Reijnevald et al (2012) found that immigrants displayed different clusters of health behaviours to native Dutch, with alcohol use associated with vigorous physical activity and smoking clustering with rule-breaking behaviour[16] These results highlight the importance of examining patterns of health risk behaviours amongst different social groups in order to better design targeted interventions.

One severely disadvantaged group within the Australian population are people who utilise the services of non-government social and community service organisations (SCSOs) such as The Salvation Army. Most clients of community social service organisations are experiencing poverty, homelessness, unemployment or mental illness, and extremely high smoking prevalence rates (over 60%) have been reported[17] Indigenous Australians are over-represented amongst clients (11-13% compared to 2-3% in the general community).[18] Given the exceptionally high smoking prevalence rates amongst this socially disadvantaged population, it is highly likely that the prevalence of other health risk behaviours is elevated, and that co-occurrence of unhealthy behaviours is high. Exploring the prevalence and clustering of health risk behaviours in this population has the potential to inform the development of public health initiatives.

Using SCSOs as an access point to a severely disadvantaged population group, this study aimed to:

1. Describe the prevalence of individual and multiple health risk behaviours (smoking, physical inactivity, inadequate fruit consumption, inadequate vegetable consumption, inadequate sun protection and risky alcohol consumption) in a sample of severely disadvantaged individuals;
2. Identify the clustering of these health risk behaviours; and
3. Explore the socio-demographic factors associated with health risk behaviour clusters.

METHODS

Procedure and subjects

A cross-sectional touch screen computer survey was conducted between February and October 2010. The Chief Executive Officer of one large SCSO was approached and

nominated services for participation. Two SCSO sites in Sydney and one SCSO site in a regional area of New South Wales (NSW), Australia, were approached and all agreed to participate. Participating services provided financial and material assistance including free grocery items, food vouchers, and assistance with paying bills to individuals and families unable to meet basic living costs. The majority of attendees for financial and material assistance are unemployed and dependent on government welfare benefits[18]

Clients attending the SCSO were invited by a caseworker to complete a health survey at the end of an appointment to seek financial and material assistance. Clients who were eligible to participate were those attending the service during the recruitment period, aged over 18 years, able to speak and/or read English, and not too distressed. Consenting clients were introduced to a research assistant who, if necessary, provided support to read and/or complete a 15 minute touch screen survey.

Measures and definitions of health status

Smoking status. Smoking prevalence data is reported elsewhere[17]. Smoking status was assessed by asking 'Do you currently smoke tobacco', with response options 'Yes, daily/ yes at least once per week/ yes at least once per month/ no, not at all'. "Current smokers" were those reporting daily or occasional smoking[19] This self-report item has been validated against carbon monoxide breath-analysis with this sample and found to exhibit high sensitivity and specificity[20]

Alcohol consumption. Alcohol consumption was assessed using the AUDIT-C brief screening test[21] The third AUDIT-C question was modified, reducing the number of standard drinks consumed on one occasion from six to four to reflect changes in Australian drinking

guidelines[22] Responses were scored as reported in Bradley et al[21] A score of ≥4 standard drinks for men and ≥3 standard drinks for women was considered 'risky' consumption[21, 23]

Inadequate fruit and vegetable consumption. Two items from the National Health Survey were used to assess i) the number of serves of fruit and ii) the number of serves of vegetables consumed each day[24, 25] A serve of vegetables was described as "½ cup of cooked vegetables like carrot or peas, or 1 cup of salad" and serve of fruit as "1 medium piece of fruit like an apple, 2 small pieces like apricots or 1 cup of chopped or canned fruit". Pictorial depictions of serve sizes were shown on prompt cards. Participants answered on response categories: 1 serve per day, 2 serves per day, 3 serves per day, 4 serves per day, 5 or more serves per day, or I don't eat [fruit or vegetables] every day. Inadequate consumption was defined as <2 serves of fruit or <5 serves of vegetables per day[26]

Physical inactivity. Validated questions from the National Health survey assessed total time spent i) walking, ii) engaging in moderate physical activity and iii) engaging in vigorous physical activity in the last seven days[27] The number of sessions of each activity was also assessed. Inadequate activity was defined as <150 minutes of PA in the previous week or less than five sessions of physical activity per week according to guidelines[28] The total number of sessions of walking, moderate activity and vigorous activity were also summed to give a 'sufficient number of sessions' dichotomous variable of <5 or ≥5. Insufficient physical activity was defined as <150 minutes of activity or <5 sessions of activity. Sufficient activity was defined as ≥150 minutes of activity and ≥5 sessions of activity.

Sun Protection. Participants were asked to report their usual sun protection practices when outside for more than 15 minutes on a summer day. Participants were asked how often they i)

wore a hat, ii) wore sunglasses, iii) used sunscreen, iv) wore protective clothing that covered most of their body and v) sought shade on a five point Likert scale ('never' to 'always'). Practice of each behaviour was classified as routine if participants answered 'usually' or 'always', and infrequent if participants answered 'never', 'rarely', or 'sometimes'.[29] Inadequate sun protection was defined as <5 sun protection behaviours practised routinely[30]

Socio-demographic characteristics. Demographic information including gender, age, Aboriginal or Torres Strait Islander status, weekly household income, employment status, marital status and highest level of completed education was collected.

Analysis

All analyses were conducted using SAS statistical software version 9.2[31] All questions were force-choice so there was no missing data. Each health risk behaviour was dichotomised (as described above) as either healthy or unhealthy. The prevalence of individual and multiple health risk behaviours was calculated using proportions and 95% confidence intervals. Past studies have used a variety of analytical techniques to assess clustering of health risk behaviours including factor analysis, multivariate regression models, cluster analysis and latent class modelling. As we were interested in describing how health behaviours cluster into groups, we used exploratory factor analysis techniques. Each health risk behaviour was entered into factor analysis using tetrachoric correlation to account for the dichotomous variables[32] A factor loading greater than 0.4 was used to decide whether a variable loaded onto a factor. The number of retained factors was determined by the number of eigenvalues greater than one. For each identified factor, we calculated a factor score equal to the number of health risk factors. Factor scores were then tested for association with each socio-demographic variable using Chi Square tests for dichotomous and categorical variables, and

t-tests for the one continuous variable (age). Any demographic variable with a related association p value of <0.2 was entered into a backwards stepwise ordinal logistic regression to identify the socio-demographic predictors of the factor score.

Ethical Approval

This research was approved by the University of Newcastle Human Research Ethics Committee.

RESULTS

Sample

A total of 727 clients attended the three sites during the study period of which 552 were approached to participate. The main reasons for not being approached to participate included having already completed the survey at an earlier visit (71 clients), being assessed by service staff as not suitable to participate (e.g. distressed, unwell, intoxicated or uncooperative, 39 clients) and not being able to speak or read English (13 clients). A total of 383 participants agreed, giving a consent rate of 69%. Demographic information is displayed in Table 1. The majority of participants were unemployed, earned less than AU$300 per week, and reported secondary school years 7-10 as their highest level of education. Using the latest available NSW population data, 53% of the sample was within the lowest quintile and a further 34% within the second lowest quintile for average weekly income compared to the NSW population mean in 2007/2008[33]

Table 1.

Sample socio-demographic characteristics of participants attending a SCSO in New South Wales (NSW), Australia (n =383).

	Mean (SD)

Age	43.8 (13)
	% (95%CI*)
Gender	
Male	55 (50.1-60.1)
Female	45 (39.9-49.9)
Highest Level of Education	
Primary school	3 (1.19-4.55)
Secondary school years 7-10	46 (41.2-51.2)
Secondary school years 11-12	17 (13.7-21.3)
Technical and further education (TAFE)	18 (13.9-21.6)
University Degree	16(12.0-19.3)
Weekly Household Income	
<$200	16 (12.5-19.9)
$200-$300	37 (32.2-41.9)
$300-$400	25 (20.7-29.4)
$400-$500	9 (6.0-11.7)
> $500	7 (4.0-9.0)
Prefer not to answer	6 (3.8-8.7)
Employment	
Employed	8 (5.1-10.5)
Unemployed or unable to work	61(56.5-66.3)
Student	5 (2.8-7.2)
Retired	5 (2.8-7.2)
Home duties	11 (7.6-13.8)
Other	10 (7.4-13.5)
Marital Status	
Partnered	15 (11.5-18.8)
Not partnered	85 (81.3-88.5)
Aboriginal or Torres Strait Islander Status	
Yes	11(7.8-14.1)
No	89 (85.9-92.2)

*CI = 95% Confidence Interval

Prevalence of single health risk behaviours

The proportion of respondents meeting recommendations for each risk factor is presented in Table 2. Almost all (98%) participants consumed fewer than five serves of vegetables each day and 62.7% consumed fewer than two serves of fruit each day. The majority of respondents did not routinely engage in sun protection practices (82.5%), smoked tobacco (61.7%)[17] and drank alcohol at risky levels (51.4%). Most respondents met recommendations for physical activity (63.5%).

Table 2.

Proportion of participants who did not meet recommendations for each risk factor (n =383).

	Has not met recommendations		
	Male (n=211) % (95% CI)	Female (n=172) % (95% CI)	Total (n =383) % (95% CI)
Smoker[17]	67.3 (60.9-73.7)	54.1 (46.5-61.6)	61.4 (56.5-66.3)
Inadequate fruit consumption	63.5 (57-70)	61.6 (54.3-69)	62.7 (57.8-67.5)
Inadequate vegetable consumption	97.2 (94.9-99.4)	98.8 (97.2-1)	97.9 (96.5-99.3)
Insufficient physical activity	33.1 (26.8-39.6)	41.3 (33.8-48.7)	36.8 (32-41.7)
Inadequate sun protection	85.8 (81-90.5)	78.5 (72.2-84.7)	82.5 (78.7-86.3)
Risky alcohol consumption	59.2 (52.6-65.9)	41.9 (34.4-49.3)	51.4 (46.4-56.5)

Note: estimates based on self-reported data.

Prevalence of multiple health risk behaviours

The proportion of male and female respondents reporting multiple lifestyle risk factors is shown in figure 1. Only two participants (0.5%) reported no risk factors. Most respondents (86.9%) reported three or more risk factors. There were no differences in the mean number of multiple risk factors for individuals by income or employment; however, male participants (t=2.44, p=0.01) and younger participants (r= -0.17, n= 383, p<0.001) were more likely to report a higher number of risk factors. Participants who had completed years 11 or 12 of high school, University or vocational college (TAFE) had a significantly lower mean number of

risk factors compared to those who had not completed high school to at least a year 11 level (F= 4.48, df=3, p<0.01).

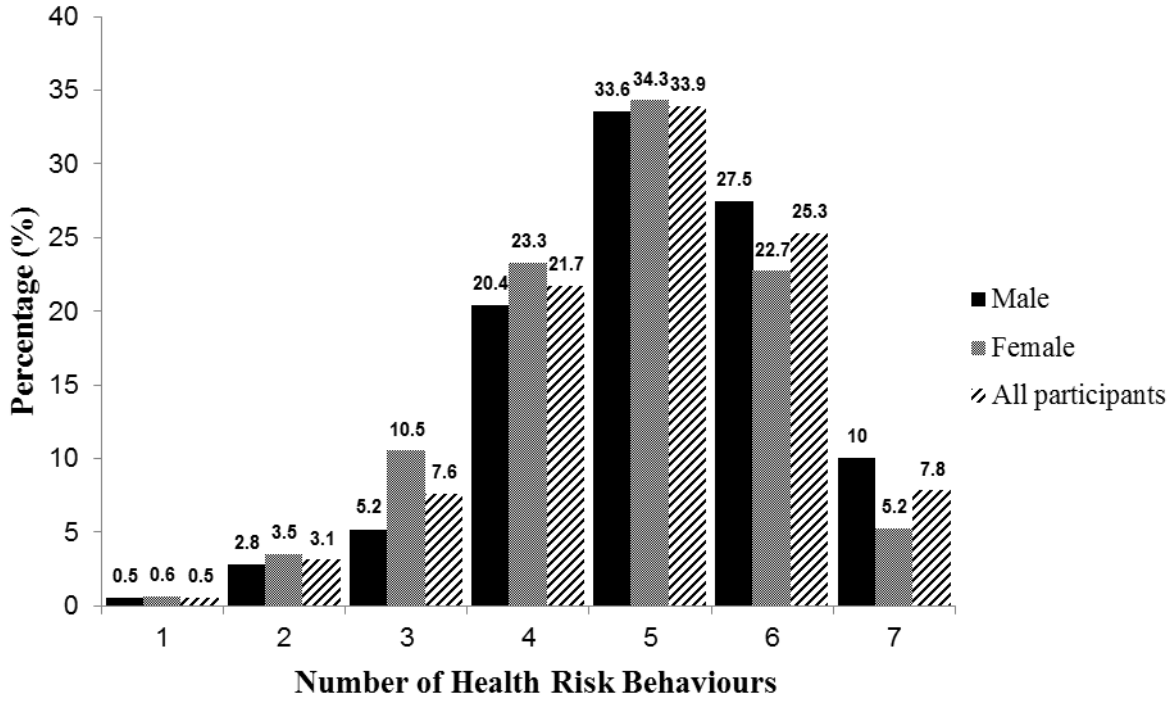

Figure 1. *Proportion of multiple lifestyle risk factors among male and female participants (n =383) attending a social and community service organisation in New South Wales, Australia, in 2010.*

Clustering of health behaviours

Rotated factor loadings are presented in Table 3. Smoking and Alcohol Consumption were found to cluster together (Substance Use cluster) and physical activity, fruit consumption and vegetable consumption clustered together (physical Activity/Nutrition cluster). No associations were found for the Physical Activity/Nutrition factor on any of the socio-demographic predictors. Univariate analysis identified gender, age and education as the only significant potential predictors for the Substance Use factor. Results of the ordinal logistic regression are shown in table 4. Male participants were at greater risk of both smoking and

drinking alcohol at a risky level. A five year decrease in age was equivalent to an increase of 1.2 times the odds of risk for substance use. Those with a secondary school year 10 or lower education had 1.9 times the odds of substance use compared to those with a college/university level education.

Table 3.

Rotated factor loadings (all significant at 0.4).n=383.

	Factor 1	**Factor 2**
	Substance Use	**Physical Activity/Nutrition**
Smoking	.54	
Alcohol Consumption	.60	
Physical Activity		.48
Fruit consumption		.46
Vegetable consumption		.65

Table 4.

Results of logistic regression for the substance use factor (n=383).

	Crude		**Adjusted**	
Variable	**OR* (95% CI)**	**P value**	**OR (95% CI)**	**P value**
Gender				
Female	1.00		1.00	
Male	2.1 (1.4-3.0)	0.0001	2.3 (1.6 – 3.4)	<0.0001
Age				
5 year decrease	1.2 (1.1-1.3)	<0.0001	1.2 (1.1-1.3)	

				<0.0001
Education				
Less than secondary school year 10	1.00		1.00	
Secondary school year 11-12	0.71 (0.43-1.2)	0.1993	0.65 (0.38-1.1)	0.1126
TAFE	0.61 (0.37-1.0)	0.0613	0.53 (0.31-0.90)	0.0179
University	0.49 (0.28-0.84)	0.0091	0.51 (0.30-0.89)	0.0174

*OR = Odds ratio. Model adjusted for gender, age and education.

DISCUSSION

To our knowledge, this study is the first to examine the prevalence and clustering of health risk behaviours among a sample of highly socially disadvantaged individuals attending SCSOs. The overall prevalence of single health risk behaviours was high, with more than half of the sample reporting smoking and risky alcohol consumption. This is considerably higher than Australian population rates[34, 35] Smoking prevalence compares to rates found among the homeless[36-40] and smokers with a mental illness[41] A notable finding was that more than 60% of participants met recommendations for sufficient physical activity, which is substantially higher than the general population (31.3%)[42] Participants reported more walking than moderate or vigorous activity. It is likely given the low socioeconomic status of the sample that walking was used primarily as a means of transport. Patterns of fruit and vegetable consumption were similar to that of the general population[43]

The majority of participants reported three or more health risk behaviours. While it is difficult to make direct comparisons with other studies given differences in definitions of healthy and unhealthy behaviours and study samples, an extremely small number of participants met recommendations for a healthy lifestyle. Few had none (0.5%) or only one (2.9%) of the risk factors investigated. These findings corroborate previous research which

shows that males are more likely to have multiple risk factors compared to females[3, 13] However several other studies have found contradictory results[44, 45] and further research, particularly with this population group, is needed.

Factor analysis identified two clusters of risk factors; a Substance Use cluster and a Physical Activity/Nutrition cluster. The clustering of smoking and risky alcohol consumption with young male participants is consistent with earlier research[4] despite differences in the definition of risky alcohol consumption[12] No socio-demographic variables predicted higher risk on the Physical Activity/Nutrition cluster. This is likely the result of the very high prevalence of inadequate vegetable consumption. Given the high prevalence of all lifestyle risk factors individually, in contrast to previous research, no 'healthy' risk clusters were identified[4, 10, 13] The failure to identify any associations with income or employment may be the result of the limited variability in this homogenous sample.

Implications for research

Public health initiatives have traditionally tended to target single health risk behaviours; however, there is growing debate about the need for interventions to address multiple health risk behaviours. Given the high prevalence of most of the health risk behaviours measured, effectively targeting multiple behaviours simultaneously could have significant population health implications[46] Evidence regarding the effectiveness of multiple risk factor interventions is growing, particularly amongst socially disadvantaged groups such as people in drug and alcohol treatment and those with a mental illness[47,48] Further research evaluating the effectiveness of interventions targeting multiple behaviours is needed to clarify the optimal format and timing of such an approach for highly disadvantaged groups. Although not associated with other behaviours in factor analysis, the high prevalence of poor sun

protection practices suggests interventions to address sun protection practices are also needed.

Implications for practice

Given that more than 85% of clients utilising the SCSOs had three or more health risk behaviours, SCSOs may be a suitable access point for engaging with highly disadvantaged individuals opportunistically. Public health initiatives should seek to capitalise on the reach SCSOs have to a large number of individuals at high risk of poor health outcomes, including opportunities to use SCSOs as referral points. Some work has begun to examine the acceptability of the SCSO setting for addressing smoking[49-52] and for addressing multiple risk behaviours[53]

However to be effective, such approaches will likely need to be coupled with changes to the broader social, cultural and economic influences that underlie health risk behaviours and social disadvantage. The social determinants of health framework argues that that the conditions in which people are born, grow, live, work and age (which are shaped by the distribution of money, power and resources at global, national and local levels) have a significant impact on health and the development of health disparities[54]. The principal drivers of socio-economic disparities in health include factors such as social exclusion, unemployment, housing, education and social support[55]. There is increasing awareness of the need to address these factors, as well as individual health risk behaviours, if substantial gains in reducing socioeconomic disparities are to be made[56].

Study strengths and limitations

The strengths of the study are the inclusion of a broad range of health behaviours and the recruitment of a relatively large sample of typically hard-to-reach highly socially disadvantaged group. This is a novel contribution to literature which has tended to only examine clustering of health risk behaviours among low socioeconomic groups. Factor analysis was used to explore clustering however cluster analysis, latent class analysis, discriminant analysis, and principal component analysis could also be used. Several limitations should also be acknowledged. As lifestyle risk factors were self-reported, responses may be confounded by under or over reporting due to social desirability bias. However, in a separate study, we confirmed self-report of smoking status using carbon monoxide in this setting and found that few participants misreported their smoking status[57] It is reasonable to expect, therefore, that behaviours less subject to bias than smoking such as physical activity, nutrition and sun protection are also likely to be accurately reported. The physical activity measure, which combined walking, moderate and vigorous psychical activity, may have overestimated physical activity in this low socioeconomic sample. The generalizability of the study results is limited to individuals attending SCSOs in Australia. Further similar research in other countries is warranted.

Conclusions

This study identified an extremely high prevalence of single and multiple health risk behaviours in a severely disadvantaged Australian sample attending SCSOs for welfare support. Interventions targeted at severely disadvantaged populations should consider targeting behaviours as clusters of smoking and alcohol consumption, and physical activity and nutrition. Further research is needed to validate this finding.

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