An examination of outcome expectancies of physical activity as a function of stage of change

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Abstract

Stage of change matched (SOCM) physical activity (PA) messages are effective compared to standard messages for PA interventions. However, tailoring items for SOCM interventions to include outcome expectancies has not been investigated and requires examination as a proven PA contributor. Students (aged 18 to 24) would benefit from SOCM interventions and therefore 'student's' outcome expectancies were examined. Through 'Obstacles to Action' survey data, 274 respondents completed the stage of change (SOC) algorithm and met the students' aged 18 to 24 criteria. Analysis of variance (ANOVA) between SOC for 12 outcome expectancies for each SOC to enable tailoring of most likely outcomes of PA. Findings highlighted outcome expectancies required tailoring for future SOCM interventions.

Keywords: Stage of change, physical activity, outcome expectancies

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Introduction

Physical activity (PA) has far reaching health benefits, including minimising the likelihood of obesity (Troiano, Macera and Ballard-Barbash, 2001) maintaining bone mass (Kemper, Twisk, Mechelen, Post, Roos and Lips, 2000) and being inversely related to depression (Camacho, Roberts, Lazarus, Kaplan and Cohen, 1991; Dunn *et al.*, 2005) to name a few. Despite the benefits of PA, individuals in western society are largely inactive (WHO, 2004). Numerous interventions have been employed to address inactivity; one of the most popular is stage of change matching (SOCM). SOCM involves tailoring messages based on an individual's readiness to change their behaviour, otherwise known as stage of change (SOC). The SOC algorithm outlines five stages including pre-contemplation (PC; not intending to change), contemplation (C; considering change), preparation (P; about to change), action (A; recently changed) and maintenance (M; regularly active). Messages used in SOCM interventions have included benefits, how to overcome barriers and PA 'outcome values'. PA outcome values are outcomes as a result of PA perceived to be of importance by the participant, as measured at baseline (Williams, Anderson and Winett, 2005).

Interventions using SOCM interventions to increase PA have been successful. Furthermore SOCM have been found to be more effective than the use of standard care messages to increase PA (Marcus *et al.*, 1998; Kim, Hwang and Yoo, 2004; Dutton, Povost, Tan and Smith, 2008). It should be noted, however, that SOC has been widely critiqued. Moreover, research outcomes have been conflicting (van Sluijs *et al.*, 2005). Although SOCM has often been found to be useful with PA, other research targeting alternative behaviours, for instance smoking, have argued that SOCM interventions are not effective (Aveyard *et al.*, 2009).

Research of SOCM has examined the effectiveness of tailored message. Previous research has found outcome values (Courneya, 1995) and outcome expectancies (Ommundsen, Page, Ku and Cooper, 2008; Rogers et al. 2007) vary as a function of SOC. Outcome expectancies of PA reflect the "perceived likelihood that performing the behavior will produce a given outcome" (Ajzen, 2002, p668), such as 'Improve overall fitness level'. Thus far, PA SOCM interventions have accounted for participants perceived values of PA but they have not accounted for the perceived likelihood of PA outcomes, i.e., outcome expectancies. Outcome expectancies have been found to influence PA levels (Steinhardt and Dishman, 1989; Rogers et al., 2007) and behavioural intention to be active (Gao, Xiang, Lee and Harrison, 2008). For outcome expectancies to be used within SOCM interventions, analyses should be conducted to examine whether expected outcomes vary based on SOC. Discovering outcome expectancies perceived as most likely to occur could also ensure messages were relevant to the participant. Relevance may extend engagement with the PA program (Dishman, 1982). The present study examined whether individuals rated expected outcomes differently based on their SOC. The findings from the present study would enhance research and practice by extending the tailoring message literature to include expected outcomes.

The present study examined student's endorsement of various outcome expectancies regarding regular physical activity (RPA) and whether these varied based on their SOC. Students were selected for the current study because this research was part of a larger study that employed a text message intervention to increase PA amongst a student sample. It is important to address students PA because they are an at risk sample for inactivity (Sinclair *et al.*, 2005) and tend to put on weight during early adulthood (18-24 years; Racette *et al.*, 2005). The current study was employed to develop the messages for the later intervention. In particular, we were interested in whether students' expectations regarding the outcomes of PA differed based on their SOC. The findings reported in the current study are based on 2003 data collected through the Sports and Recreation New Zealand (SPARC) 'Obstacles to Action' survey (Sullivan *et al.*, 2003). The current study had one aim which was to identify whether expected outcomes concerning PA differ significantly as a function of SOC.

Methodology

The data examined in this study was collected as part of a larger study conducted by SPARC in 2003. The present study reports the findings on SOC and outcome expectancies of PA. One question was used to measure SOC and twelve questions were used to measure outcome expectancies. The actual questions are depicted in Appendix 1. The 12 questions came directly from questions in the healthstyles survey designed by Maibach *et al.*, (1996). They were modified slightly in the SPARC study to fit a New Zealand (NZ) context. The survey instrument is described in further detail in Sullivan *et al.*, 2003.

To generate a representative sample of New Zealanders, SPARC randomly selected 14,000 individuals from the NZ electoral roll to be sent a survey. Oversampling of Maori and under 25's was completed to counter under-representation. A 61% response rate was achieved with 8, 921 respondents aged 15 and older completing the survey (Sullivan *et al.*, 2003). Maori were oversampled (based upon being on the Maori Electoral role) by 26% to compensate for poor response rates. Therefore, efforts to achieve a representative sample of the NZ student population can only be assumed since Census 2006 data does not provide demographic makeup of the student population. The sample was restricted in the present study to 18 to 24 year olds with recorded occupations as 'student' because we were interested in a student sample of this age group. This resulted in a sample size of 274 for analysis.

Variables for Analysis

SOC towards PA was the independent variable. SOC was determined in the SPARC study by asking participants whether they were completing RPA. The definition of RPA provided to participants was "At least 15 minutes of vigorous activity (makes you 'huff and puff') or a total of 30 minutes or more of moderate activity (causes a slight but noticeable increase in breathing and heart rate) each day for [five] or more days each week. Include brisk walking" (Sullivan *et al.*, 2003, p52). Participants' responses determined their SOC towards PA (see Appendix).

The dependent variables were 12 outcome expectancies used to determine whether differences existed between outcome expectancies and SOC. The definition of RPA was supplied again. Participants rated how likely they would be to experience the 12 outcomes on

a five point likert scale (1=not at all likely, 5= very likely). Use of these variables then enabled a between group analysis using ANOVA across SOC for each outcome expectancy as well as a Bonferroni pairwise post hoc analysis.

Results

Participants were categorised into one of the five SOC toward PA: PC (12.0%), C (16.1%), P (19.0%), A (15.7%) and M (37.2%) as shown in table one. Significant differences were revealed between males and females for placement within SOC (χ^2 =21.053, df=4, p<.01; see table one), aligning with previous research (Rosen, 2000). Further analysis revealed significantly more males were within the M stage (45.1%) compared to the C stage (18.2%; χ^2 =9.555, df=1, p<.01) as well as in comparison to the P stage (19.2%; χ^2 =9.959, df=1, p<.01). The number of males within the P stage (19.2%) in comparison to the PC stage (48.5%) was also significantly different (χ^2 =8.137, df=1, p<.01). Analysis of ethnicity found no significant differences across SOC. However, comparison between the C and M stage for Maori ethnicity found significant differences (χ^2 =6.683, df=1, p<.05). Other demographic variables such as age revealed no significant differences across SOC (χ^2 =5.821, df=4, p>.05).

	Та	ble 1:	Sample C	haracteristics	5		
				SOC			
	Overall	PC	С	Р	А	М	Р
Sample size	274	33	44	52	43	102	(fisher exact)
Age (18-19/ 20-24) %	54.5/ 45.5	40.9/ 59.1	30.8/ 69.2	30.8/ 69.2	32.6/ 67.4	36.3/ 63.7	.215
Sex (Male/ Female) %	32.8/ 67.2	48.5/ 51.5	18.2/ 81.8	19.2/ 80.8	23.3/76.7	45.1/ 54.9	.000
Ethnicity* %							
NZ	73.4	60.6	65.9	78.8	69.8	79.4	.136
Maori	8.4	9.1	18.2	5.8	9.3	4.9	.103
Chinese	9.5	21.2	9.1	9.6	9.3	5.9	.144
Other	18.6	18.2	15.9	21.2	23.3	16.7	.861

*Participants were able to choose more than one ethnicity

The outcome expectancies perceived as most likely to occur from RPA included 'Improve your overall fitness level'(4.35) and 'Feel good about yourself' (4.21), 'Have more energy' (4.04) and 'Have fun' (3.92). The examination across SOC and expected outcomes revealed 10 of the 12 expected outcomes varied as a function of SOC. 'Get to be with people/ socialise' (F(4, 269)=.467, p>.05) and 'Set good examples to others' (F(4, 269)=1.683, p>.05) did not vary. The means and significance levels are presented in table two. To identify where the differences were occurring a Bonferroni post hoc test was employed. This analysis revealed that for eight of the 12 outcome expectancies, individuals in the PC SOC rated them differently to individuals in the other SOC.

	Table 2:	Means of	Outcome Ex	pectancies b	y SOC		
List of tangible rewards		Means	(±SD) of expe	ected outcom	es (1=not at al	l likely,	
people may experience	Overall	5=Very likely) for each SOC toward PA				Sig	
when they engage in	(n=274)	PC	C(n-14)	$\mathbf{P}(n-52)$	Λ (n-12)	М	- 51g.
"RPA"		(n=33)	C (11=44)	r (II=32)	A (II=43)	(n=102)	
Improve your overall	4.35	4.06	4.16	4.42	4.49	4.43	022
fitness level	(±.77)	(±.75)	(±.75)	(±.75)	(±.77)	(±.76)	.052

Feel good about	4.21	3.67	4.14	4.40	4.37	4.25		
yourself	(±.83)	(±1.08)	(±.73)	$(\pm .75)^{pc}$	$(\pm .79)^{pc}$	$(\pm .78)^{pc}$.001	
Have more energy	4.04	3.64	4.07	4.35	4.05	4.00	000	
Have more energy	(±.87)	(±1.08)	(±.73)	$(\pm .81)^{pc}$	(±.79)	(±.88)	.008	
Have fur	3.92	3.33	3.77	3.90	4.05	4.12	002	
Have lun	(±1.03)	(±1.24)	(±.89)	(±1.12)	$(\pm .92)^{pc}$	$(\pm .94)^{pc}$.003	
East many relevad	3.88	3.33	3.80	4.10	4.02	3.92	005	
reel more relaxed	(±.97)	(±1.19)	(±1.00)	$(\pm .89)^{pc}$	$(\pm .77)^{pc}$	$(\pm .94)^{\rm pc}$.005	
Loss or maintain weight	3.85	3.33	3.95	4.10	3.93	3.81	020	
Lose of mannani weight	(±1.05)	(±1.31)	(±.81)	$(\pm .98)^{pc}$	(±1.01)	(±1.07)	.020	
Sleep more coundly	3.82	3.18	3.70	3.98	4.02	3.91	002	
Sleep more soundry	(±1.07	(±1.13)	(±1.02)	$(\pm 1.02)^{\rm pc}$	$(\pm .94)^{pc}$	$(\pm 1.09)^{\rm pc}$.003	
Live e longer life	3.76	3.48	3.77	4.06	3.65	3.75	001	
Live a longer life	(±.98)	(±1.15)	(±.89)	(±.96)	(±.97)	(±.95)	.091	
Look botton	3.76	3.00	3.70	4.12	3.86	3.81	000	
Look better	(±1.08)	(±1.20)	$(\pm 1.00)^{\rm pc}$	$(\pm 1.00)^{\rm pc}$	$(\pm 1.06)^{\rm pc}$	$(\pm 1.00)^{\rm pc}$.000	
Feel more in control of	3.64	3.06	3.75	3.79	3.74	3.67	022	
your life	(±1.13)	(±1.12)	(±1.12)	$(\pm 1.13)^{pc}$	(±1.20)	(±1.07)	.033	
Get to be with people/	3.34	3.30	3.34	3.23	3.53	3.33	760	
socialise	(±1.11)	(±1.07)	(±1.03)	(±1.10)	(±1.08)	(±1.17)	.700	
Set good examples to	3.25	2.76	3.41	3.25	3.30	3.31	154	
others	(±1.20)	(±1.17	(±1.09)	(±1.31)	(±1.24)	(±1.17)	.134	

Bonferroni post hoc test= ^{pc}Signifcantly different (p<.05) compared to pre-contemplation stage

Descriptive means of each outcome expectancy revealed that individuals in the P stage rated the expected outcomes the most strongly. For instance, individuals in the P stage rated 'Feel good about yourself', 'Have more energy', 'Feel more relaxed', 'Lose or maintain weight', 'Live a longer life', and 'Look better' more highly than did individuals in any other stage. The order of likelihood of experiencing the twelve expected outcomes, based upon the means, is displayed within table three.

Table 3: Rank O	order of Expe	riencing PA	A Outcome (Overall and	by each SO	С
Expected Outcomes	Rank order	of highest (1) to lowest ((12) mean va	lues rated by	each SOC
Expected Outcomes	Overall	PC	С	Р	А	М
Improve your overall fitness level	1	1	1	1	1	1
Feel good about yourself	2	2	2	2	2	2
Have more energy	3	3	3	3	3	4
Have fun	4	6	6=	9	4	3
Feel more relaxed	5	5	5	5	5	5
Lose or maintain weight	6	7	4	6	7	7
Sleep more soundly	7	9	10	8	6	6
Live a longer life	8	4	6=	7	10	9
Look better	9	11	9	4	8	8
Feel more in control of your life	10	10	8	10	9	10
Get to be with people/ socialise	11	8	12	12	11	11
Set good examples to others	12	12	11	11	12	12

Discussion and Conclusion

This study identified students' perceptions of the most likely outcome expectancies of PA varied as a function of SOC. The findings showed 10 out of 12 PA outcome expectancies varied significantly across the five stages of change which is consistent with previous research (Ommundsen *et al.*, 2008; Rogers *et al.*, 2007). The outcome expectancies are listed

in order from most likely to least likely for each SOC in table three. 'Improve overall fitness level' and 'feel good about yourself' were rated as the most important outcomes across all SOC. This suggests that some messages are relevant to all SOC and would not require tailoring. Outcome expectancies that were not significantly different across SOC related to interacting with others ('Get to be with people/ socialise', 'Set good examples to others'). These were also found to be the lowest expected outcomes of PA overall. Table three specifies which messages could be prioritised for each SOC and may be of assistance for tailoring messages for future SOCM PA interventions aimed at students. Based on the means it was observed that outcome expectancies varied across all five SOC, however, post hoc probing revealed that these differences were largely driven by individuals in the PC SOC. The observed variation in means suggests that a larger sample size may have lead to significant differences across all five SOC.

The present findings reinforce the fact that messages should be tailored based on individuals SOC. In particular, individuals contemplating exercise may view the expected outcomes very differently than those already engaging in PA. This information is essential when considering that expected outcomes believed to be unattainable by participants can make them drop out sooner from PA programs (Dishman, 1982). The findings suggest that messages should be tailored to orientate individuals to their beliefs toward PA. Past research has addressed messages tailored toward an individual's importance of PA outcomes (Williams, Andersen and Winnett, 2005). This was the first study to outline differences in outcome expectancies relating to SOC. It therefore extends previous research by highlighting how outcome expectancies differ based on individuals SOC.

Findings from this study were used to select messages for a subsequent intervention to target students PA. Preliminary analysis has revealed that the intervention was successful. It is also important to mention a number of limitations of the current study. In particular, the current study was limited by self report of SOC, small sample size and a select sample. It should be added that while the primary focus of this paper was to understand whether outcome expectancies were a function of SOC, it was interesting to note sex differences between SOC. Future research could also investigate outcome expectancies for sex differences within and across SOC. Examination within future research may also attempt to understand the relation between expected outcomes and SOC across a larger sample. Furthermore, investigation using different sample groups may reveal systematic differences between all SOC and understand whether relevance of messages vary by sample. In conclusion, the current findings show individuals perceive the likelihood of the outcomes of PA differently depending on their SOC towards PA. Although SOC has its limitations, these findings suggest that messages for PA interventions should be tailored to match individuals SOC.

Appendix:

Stuge of change to ward physical activity question.				
	Are you "regularly physically active" according to the definition below?			
Stage of Change	Definition: "Regular physical activity" means at least 15 minutes of vigorous activity			
based upon	(makes you 'huff and puff') or a total of 30 minutes or more of moderate activity (causes			
response chosen	a slight but noticeable increase in breathing and heart rate) each day for 5 or more days			
	each week. Include brisk walking.			
Pre-contemplation	No, and I do not intend to be in the next 6 months			
Contemplation	No, but I am thinking about starting to be in the next 6 months			
Preparation	No, but I intend to begin in the next 30 days			

Stage of Change toward physical activity question:

Action	Yes, I am but only began in the last 6 months
Maintenance	Yes, I am and have been for more than 6 months

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