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Predicting Maintenance of Attendance at Walking Groups: Testing Constructs From Three Leading Maintenance Theories

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Objective: Little is known about the processes and factors that account for maintenance, with several theories existing that have not been subject to many empirical tests. The aim of this study was to test how well theoretical constructs derived from the Health Action Process Approach, Rothman's theory of maintenance, and Verplanken's approach to habitual behavior predicted maintenance of attendance at walking groups. **Method:** 114 participants, who had already attended walking groups in the community for at least 3 months, completed a questionnaire assessing theoretical constructs regarding maintenance. An objective assessment of attendance over the subsequent 3 months was gained. Multilevel modeling was used to predict maintenance, controlling for clustering within walking groups. **Results:** Recovery self-efficacy predicted maintenance, even after accounting for clustering. Satisfaction with social outcomes, satisfaction with health outcomes, and overall satisfaction predicted maintenance, but only satisfaction with health outcomes significantly predicted maintenance after accounting for clustering. Self-reported habitual behavior did not predict maintenance despite mean previous attendance being 20.7 months. **Conclusions:** Recovery self-efficacy, and satisfaction with health outcomes of walking group attendance appeared to be important for objectively measured maintenance, whereas self-reported habit appeared not to be important for maintenance at walking groups. The findings suggest that there is a need for intervention studies to boost recovery self-efficacy and satisfaction with outcomes of walking group attendance, to assess impact on maintenance.

Keywords: maintenance, physical activity, theory, walking groups

Major health benefits from physical activity (PA) are gained when people are physically active on a regular basis over the long term (United Kingdom Department of Health, 2011; U.S. Department of Health & Human Services, 2008). However, there has been a lack of intervention aimed at promoting maintenance of PA and consequently a lack of evidence about the factors that account for PA maintenance (Fjeldsoe, Neuhaus, Winkler, & Eakin, 2011).

A major obstacle when investigating maintenance of PA is that there is a lack of consensus on when maintenance has been

achieved. A commonly accepted working definition is that PA is considered to be maintained when participants have engaged in regular PA for at least 3 to 6 months subsequent to completion of an intervention (Fjeldsoe et al., 2011). By contrast, other theories claim that behavior is maintained when it operates effortlessly and efficiently, without specifying the time needed for this to be achieved (e.g., Bargh, 1992). Despite this, several theories have identified constructs that are proposed to be important in accounting for maintenance.

The Health Action Process Approach (HAPA) claims that social-cognitive constructs of recovery self-efficacy and maintenance self-efficacy are important to explain maintenance of behavior change (Schwarzer, 2008). Maintenance self-efficacy describes optimistic beliefs about one's capacity to sustain the behavior regardless of barriers during both behavior change and its maintenance. Recovery self-efficacy describes optimistic beliefs about one's ability to resume actions after relapses.

Rothman (2000; Rothman, Baldwin, Hertel, & Fuglestad, 2011) claimed that when people feel satisfied with the overall experience and the outcomes of this experience they maintain their behavior. For longer periods of maintenance Rothman, Baldwin, Hertel, and Fuglestad (2011) hypothesize that automatic constructs supported by satisfaction with the experience might influence maintenance. However, they provide little further elaboration on this hypothesis.

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Verplanken and Orbell's (2003) approach to habit proposed that the key features of habitual behaviors are: the frequency of behavior, the automaticity of the behavior, and a person's self-description when performing that behavior in a stable environment. This focus on automaticity followed earlier theorists, including Bargh (1992). Based on this definition, Verplanken and Orbell (2003) focused their research on developing a measurement of habit: the Self-Report Habit Index (SRHI).

Despite these different theories making distinct predictions regarding which constructs are important in predicting maintenance, there is a dearth of research comparing them in terms of their competing predictions. Such comparison would allow researchers to identify the theoretical constructs that most strongly determine maintenance and thereby develop more effective interventions (Weinstein, 1993).

The aim of the present study was therefore to compare theoretical constructs from three leading theories in terms of their capacity to predict maintenance, operationalized as attendance at walking groups. Regular walking is a form of PA that has been shown to produce significant physical health (Murphy, Nevill, Murtagh, & Holder, 2007) and mental health benefits (Robertson, Robertson, Jepson, & Maxwell, 2012). A recent systematic review found that walking groups are effective at producing increases in PA of sufficient size to have a significant impact on health (Kassavou, Turner, & French, 2013).

Hypotheses regarding which constructs would predict maintenance were derived from the following theories: (a) HAPA: recovery self-efficacy and maintenance self-efficacy; (b) Rothman's theory: satisfaction with the experience and outcomes of this experience; and (c) Verplanken and Orbell's approach to habit: SRHI. It was further hypothesized based on Verplanken and Orbell's approach to habit that prior attendance would moderate the relationship between SRHI and future attendance, with stronger associations after a longer period of prior attendance.

Method

Design

A prospective cohort study was used with participants who had already attended walking groups for at least 3 months completing questionnaires and then having their attendance followed up for a further 3 months.

Participants

An a priori power calculation using the G-power program (Faul, Erdfelder, Buchner, & Lang, 2009) showed that a sample of 109 participants would provide power of 0.9 to detect medium sized effects in terms of Pearson's correlation coefficient ($r = .3$) for a continuous predictor variable using a two-tailed hypothesis test ($H_0: r = 0$) and Type I error rate of 0.05. The 114 participants included in the analysis of the present study were between 20 and 89 years old (90% of them were between 40 and 79 years), the majority were female (77%) and retired (54%).

Procedure

All walkers above 18 years of age, who attended walking groups organized in one of five local authority schemes by Walking for

Health (WfH) in the Midlands of England were eligible for this study. Institutional Ethics Committee approval was obtained. A total of 500 walkers were posted a letter inviting them to take part in the study, an information sheet explaining the purpose of the study, an informed consent form, a brief questionnaire and a reply paid return envelope. In total, 114 walkers completed and returned the postal questionnaire.

Measures

Maintenance. Data on walkers' attendance was routinely recorded by walk-leaders and entered on a central WfH database. Records of attendance for each participant were obtained from WfH for a period of 13 weeks after the date that the walker completed the questionnaire.

HAPA constructs. The items used by Luszczynska, Schwarzer, Lippke, and Mazurkiewicz (2011) were the basis of measures of recovery self-efficacy (four items) and maintenance self-efficacy (five items). The initial wording was adapted, for use with walking groups (e.g., "I am confident that I can return to walking in this group again, even if I did not walk for some time because I had no time for doing it on a regular basis" [recovery self-efficacy, Cronbach's alpha $\alpha = .89$] and "I am confident that I can keep participating in this walking group on a regular basis even if I am worried and troubled" [maintenance self-efficacy, $\alpha = .96$]).

Rothman's theoretical constructs. The items used by Baldwin, Rothman, and Jeffery (2009) were the basis of measures assessing satisfaction with expected outcomes. Salient outcome expectancies regarding benefits from walking groups had been identified in previous research (Kassavou, 2012), relating to health and social outcomes. Walkers' satisfaction with expected health outcomes was measured with three items, for example, "How satisfied are you with any changes in your health, as a result of participating in this walking group?" ($\alpha = .89$). Walkers' satisfaction with expected social outcomes was measured with three items for example, "How satisfied are you with being able to talk with other walkers in this walking group?" ($\alpha = .86$). Walkers' overall satisfaction with walking groups was measured with two items for example, "Overall, how satisfied are you with this walking group?" ($\alpha = .89$).

Verplanken and Orbell's approach to habit. Habit was measured using the 12-item Self-Report Habit Index (SRHI; Verplanken & Orbell, 2003; $\alpha = .92$).

Duration of past attendance. Duration of *past attendance* at walking groups was measured using a single self-reported item: "How long have you participated in this walking group? Please write approximate months."

Statistical Analysis

Simple univariate linear regression analysis was initially used to investigate the relationship between predictor variables and the dependent variable maintenance. Moderator analysis was employed to test whether duration of past participation moderated the association between SRHI and maintenance. To explicitly account for the hierarchical nature of the data (participants nested within walking groups) multilevel models were fitted. Walking groups was modeled as a random effect and all predictor variables considered in the simple regression analysis were fitted as fixed

effects on the participant-level. Individual predictor effect sizes were estimated as Pearson’s correlation coefficients r , in the linear regression analysis and as proportional reduction in variance statistic in the multilevel modeling. This estimate corresponds to the squared semipartial correlation coefficient in multiple linear regression (Peugh, 2010).

Results

T1 The means, standard deviation (*SD*), and correlation coefficients of all variables are reported in Table 1. Walkers in this sample had a mean duration of past participation of 20.7 months, and participated in walking groups on average of 9.17 times over the 13-week period of this study (see Table 1). The 114 walkers attended 40 different walking groups. The intraclass correlation coefficient was equal to 0.20, meaning that roughly 20% of the variance of maintenance of attendance can be attributed to walking group level characteristics. The results for the random effect model suggest that there was some variation (albeit not statistically significant) in maintenance between walking groups ($\beta_{\text{walk}} = 16.7, SE = 8.9, p = .06$). Maintenance self-efficacy did not predict maintenance in any performed analysis. Satisfaction with social outcomes and overall satisfaction were significant predictors of maintenance, but not when accounting for walking clustering via multilevel modeling. Satisfaction with health outcomes and recovery self-efficacy predicted maintenance, even after accounting for clustering. Finally, the SRHI did not predict maintenance in any analysis despite participants having successfully maintained attendance for a considerable period of time (see Table 2).

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consistently maintaining attendance. This may be a feature of PA behavior within an organized group schedule, which requires attendance at a specific time and place. By contrast, maintenance self-efficacy might be more important for individually based activities, which could be tailored to fit a personal routine and, thus, allow more regular performance of behavior. This hypothesis regarding the relative influence of constructs according to types of behavior is an empirical question, which warrants further attention.

All satisfaction constructs predicted maintenance to some extent. This finding suggests that people are more likely to maintain behavior following an intervention when they receive satisfaction from multiple sources (e.g., health and social). However, when accounting for clustering due to walking groups it appears that satisfaction with health outcomes predicts maintenance independently of others in the group, in contrast to satisfaction with social outcomes and overall satisfaction. Thus, overall satisfaction and satisfaction with social outcomes appear to be at least partly characteristics of groups. Further examination of how satisfaction with social outcomes is brought about in groups appears warranted, as well as precisely what aspects of their health people particularly value, resulting in maintained attendance.

Moreover, this study showed that SRHI did not predict maintenance, even after attending for long periods of time. This could be due to walkers not attending walking groups frequently (i.e., three times per month) and so this behavior may not have been habitual. Further, attendance at walking groups might not be considered to be habitual activity compared with other forms of PA, such as walking for transport. Alternatively, it may be that self-report measures of habit are intrinsically not valid, as they require self-reports of automatic processes. It is important to note that even if this is true, the lack of validity of self-reports of habitual behavior does not imply that habitual/automatic processes are not important.

Initiatives aiming at promoting maintenance at walking groups could usefully consider strategies aiming at facilitating both regular walkers’ social-cognitive (i.e., efficacy to resume actions after relapses) and affective (i.e., satisfaction of walkers’ initial expectations) constructs. Some of these strategies could be to identify walkers’ initial expectations, prompt them to set goals

Discussion

Recovery self-efficacy but not maintenance self-efficacy predicted maintenance of attendance at walking groups. For the present study, the average frequency of attendance at walking groups was nine times in a period of 3 months. As each walking group took place one or more times per week, participants had generally not attended all walking group sessions. Thus, their efficacy to resume behavior after not attending might be more important than

Table 1
Descriptive Statistics and Pearson Correlations (Columns 5–11) of All Variables Included in the Study

Variables	Cronbach Alpha	Mean (SD)	N	2	3	4	5	6	7	8
1. Maintenance of attendance for three months post questionnaire (in weeks)		9.17 (9.20)	114	.192*	.201*	.206*	.209*	.077	-.065	.003
2. Satisfaction with health outcomes	.89	3.83 (2.27) (Scores range: -2 to + 2)	113		.288*	.428*	-.072	-.004	-.277*	-.037
3. Satisfaction with social outcomes	.86	4.84 (1.75) (Scores range: -2 to + 2)	112			.665**	.158	.193*	-.279*	.118
4. Overall satisfaction	.89	3.36 (1.13) (Scores range: -2 to + 2)	111				.095	.133	-.291*	.129
5. Recovery self-efficacy	.86	10.5 (4.03) (Scores range: 1 to 4)	110					.671**	-.173	.95
6. Maintenance self-efficacy	.96	14.7 (5.13) (Scores range: 1 to 4)	110						-.188*	.041
7. SRHI	.92	27.08 (11.9) (Scores range: 1 to 5)	111							-.128
8. Past behavior (in months)		20.7 (26.6)	110							

* $p < .05$. ** $p < .01$.

Table 2
Statistical Modeling

	B	SE	r^2	R ²	Sig
HAPA					
Linear regression					
Recovery self-efficacy	.48	.22	.21	.04	.03
Maintenance self-efficacy	.14	.17	.08	.01	.43
Multilevel modeling: Accounting for clustering at walking group level					
Recovery self-efficacy	.41	.21	.12		.05
Maintenance self-efficacy	.05	.17	.01		.75
Rothmans' theory					
Linear regression					
Satisfaction with health outcomes	.78	.38	.19	.04	.04
Satisfaction with social outcomes	1.06	.49	.20	.04	.03
Overall satisfaction	1.68	.77	.27	.04	.03
Multilevel modeling: Accounting for clustering at walking group level					
Satisfaction with health outcomes	.78	.37	.18		.04
Satisfaction with social outcomes	.79	.53	.08		.14
Overall satisfaction	1.4	.84	.11		.10
Verplanken and Orbell's theory					
Linear regression					
SRHI	-.050	.07	-.06	0.00	.50
Multilevel modeling: Accounting for clustering at walking group level					
SRHI	-.03	.07	.02		.64
Moderator analysis					
Past attendance* SRHI	-.00	.00	-.08	.00	.74

Note. Column r^2 shows local effect sizes: Pearson's correlation coefficient for simple linear regression and proportional reduction in variance statistic for multilevel models.

relevant to these expectations, facilitate their ability to achieve these goals, and encourage them to self-monitor with regard to these. In case of facilitating recovery self-efficacy a potential strategy could be to help walkers to understand and identify factors that might result in failure to maintain attendance at walking groups on a regular basis and prompt walkers to make plans to manage these situations when they arise.

Future research should include all theoretical constructs proposed by these theories, rather than the selected constructs examined in the present study. It should also compare how well these constructs predict initiation and maintenance of behavior change to identify if their contribution is unique to each stage. The effects of manipulating these constructs should be examined. Future theory based research could usefully include other objective measures of behavior (e.g., pedometers) and compare findings from walking groups with findings from other types of PA. The lack of association between the SRHI and objectively assessed behavior in the present study indicates a need for further such tests to establish the validity of this measure, and also highlights the need for further research to delineate which behaviors are habitual and which are not. Crucially, a better definition of maintenance of behavior change is required by future research. Making progress on this important topic is hampered by a failure to agree what is the phenomenon being studied.

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