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Adults' Preferences for Intrinsically versus Extrinsically Framed Health Messages Tailored According to Stages of Change: Effects on the Intention to Engage in Physical Activity

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Physical activity rates have prevailed as a worldwide health concern. The WHO's *Global Action Plan on Physical Activity 2018–2030* articulated the need to test effective communication strategies that deliver information to enhance physical activity behaviors. The Comprehensive Messaging Strategy for Sustained Behavior Change (CMSSBC) is a promising approach that advocates tailoring messages to one's stage of change and framing them intrinsically rather than extrinsically. This study examined adults' decisions to read and engage with physical activity messages aligned with CMSSBC, considering the role of the message frame, stage of change of the message, stage of change of the participant, as well as the participants goal orientation. Participants ($n_{male} = 91$; $n_{female} = 103$) aged 25 to 65 ($\bar{x} = 39.53$; $SD = 10.80$) completed an online survey including; demographic questions, assessments of their physical activity goals and stage of change, decision to read eight messages, and a follow-up question providing the option to complete a behavior change task embedded within the messages they chose to read. Results indicated that participants were more likely to choose to read a message if it fit their goal orientation, and overall, they were significantly more likely to read intrinsic as opposed to extrinsic messages. Further, findings demonstrated that participants were more likely to complete the optional behavior change activity contained within the message if they had an intrinsic goal orientation. These findings demonstrate that physical activity information should be framed intrinsically and recognizes that one's goal orientation may significantly influence how people respond to messages.

Keywords: Self Determination Theory; goal orientation; health promotion; stage of change; messaging

Introduction

On a day-to-day basis, people residing in Western Countries are exposed to a plethora of health-related information. The context of physical activity (PA) is not exempt from this phenomenon. Due to low PA rates worldwide, combined with the deleterious effects of inactivity, the WHO (2018) detailed two *Actions* pertaining to the communication of PA information within the *Global Action Plan on Physical Activity 2018–2030*. This denotes the significance attributed to communication, alongside other policy, environmental, and behavior strategies to address pervasive physical inactivity concerns. PA messages (educational/persuasive material communicated to person(s) with intentions to increase PA; Williamson et al. 2020) serve as a fundamental communication modality, with the potential to influence one's thoughts and feelings toward their PA, which in turn influences PA behaviors. Additionally, PA messages are cost-effective, with a large reach potential (Cavill & Bauman 2004), and can be delivered alongside other behavior change strategies. Despite the recognized utility and the empirical attention they have received (for a scoping review, see

Williamson et al. 2020), scholars have argued the need for a more compelling approach to PA messages that is grounded in psychological theory (Williamson et al. 2020), based on motivation and behavioral science (Segar et al. 2016), that conveys *what* PA individuals should do, as well as *why* and *how* to do it (Latimer Brawley & Bassett 2010), and integrates interactive components – such as behavior change tasks (Pope Pelletier & Guertin 2018). One messaging approach that is derived from the above suggestions is the Comprehensive Messaging Strategy for Sustained Behavior Change (CMSSBC; Pope Pelletier & Guertin 2018).

CMSSBC

The CMSSBC (Pope Pelletier & Guertin 2018) integrates message tailoring (customizing information to one's characteristics; Latimer Brawley & Bassett 2010), and message framing (the social construction of a phenomenon; Segar et al. 2016). Based on the formative notion that people attend to, process, and form decisions differently depending on their stage of change (SoC; for summary, read; Burkholder & Evers, 2002; Prochaska DiClemente & Norcross 1992), the CMSSBC (Pope Pelletier & Guertin 2018) details four SoCs (*detection, decision, implementation, and maintenance*), to which messages should be tailored. People in the *detection stage*, fail to recognize the importance or personal relevance of PA, and benefit from information detailing why PA is important and/or relevant to them (Pope Pelletier & Guertin 2018). Individuals in the *decision stage* are aware that a problem exists, eliciting feelings of discomfort and increased receptivity to information that will alleviate the uneasiness (e.g., identifying what PA they can and want to do, while facilitating goal formation; Pope Pelletier & Guertin 2018). In the *implementation phase*, individuals have formed intentions, and should receive information that bolsters their confidence to bridge the intention-behavior gap, such as when, where, or how to be physically active (Pope Pelletier & Guertin 2018). Finally, people in the *maintenance phase* have started being physically active but need to learn how to sustain the behavior, and therefore require information (e.g., coping strategies) to help persist in this positive behavior change (Pope Pelletier & Guertin 2018). People who have maintained PA and integrated it into their lifestyle are labelled in the habit stage and no longer require informative messages (Pope Pelletier & Guertin 2018). These SoCs share commonalities with those outlined in the Transtheoretical Models (TTM; Prochaska & DiClemente 1982), however, the CMSSBC mitigates the major criticisms (e.g., arbitrary timelines; Noar Benac & Harris 2007) of the TTM. While this approach to tailoring messages holds promise, it has received little empirical attention.

As previously mentioned, the CMSSBC advocates message framing. Grounded in the Self-Determination theory (SDT; Deci & Ryan 1985), the CMSSBC recognizes that messages can be framed in an intrinsic or extrinsic manner. Intrinsic messages emphasize autonomous motives ('why' someone wants to be physically active) and intrinsic goals ('what' active aspirations they wish to achieve; Deci & Ryan 2000). This includes messages that underscore innately pleasurable activities, achieving personal growth, pursuing personally challenging tasks or internally valued goals, such as improved cardiovascular health or functionality. In contrast, extrinsic messages promote extrinsic goals and controlling motives such as appearance, superiority in social comparisons, ego-fulfillment, or avoiding feelings of shame or guilt. The CMSSBC recommends employing intrinsic messages, as extensive SDT-based research has supported the superiority of intrinsic goals and autonomous motives over extrinsic goals and controlling motives (for a summary of this literature, see Ryan & Deci 2017).

Intrinsic versus extrinsic message framing literature

The little research that has compared intrinsic versus extrinsic framing has supported the SDT-based assertions. In general intrinsic framing has been linked with enhanced learning, deeper processing, increased mastery, persistence and performance (Vansteenkiste et al. 2007; Vansteenkiste et al. 2005; Vansteenkiste et al. 2008) while extrinsic framing was related to greater rote learning (memorization), social comparison and ego orientation, and reduced commitment (Vansteenkiste et al. 2007; Vansteenkiste et al. 2005; Vansteenkiste et al. 2004; Vansteenkiste et al. 2008). A more recent study (Pope & Pelletier 2021) illustrated that participants perceived intrinsic messages to be more persuasive and ranked them more favorably than extrinsic messages tailored to the same SoC. Interestingly, while these findings support the superiority of framing information intrinsically, in general researchers have proposed that the goal orientation (intrinsic versus extrinsic) of an individual may influence their perception of intrinsic versus extrinsic messages. As such, Pope and colleagues (2018) recommended testing the Fit Perspective between one's goal orientation and the message frame as a message tailoring strategy.

Message tailoring to Fit Perspective

Based on the Fit Perspective, it has been put forth that intrinsic messages may be more suitable for those with an intrinsic goal orientation, while extrinsically framed messages align with an extrinsic goal orientation (Lee & Pounders 2019; Vansteenkiste et al. 2008). However, these studies failed to provide compelling evidence for this assertion, with one study supporting the Fit Perspective (Lee & Pounders 2019) and the other opposing it (Vansteenkiste et al. 2008). In summary, the literature has provided foundational empirical evidence of intrinsically versus extrinsically framed messages, albeit, with the exception of the study by Pope and Pelletier (2021), these studies primarily ascribed participants to the framing condition (intrinsic versus extrinsic message frame).

The present study

The value of the bulk of the messaging literature that has ascribed messages to participants (as opposed to letting them choose) is convincing. However, if the individual is not compelled to read the information conveyed within the message – they are unlikely to exert energy processing it or carry out the intended behavior in the real world. Therefore, the present study extends the literature by examining freely chosen messages guided by the CMSSBC in the context of PA. This line of inquiry is of value as it represents a realistic scenario in which a person is presented with a variety of PA related information and given the opportunity to choose what they wish to read. The purpose of the present study was to investigate adults' preferences for and actions towards PA messages, with consideration for the individuals' goal orientation and SoC.

Four research questions guided the present study. RQ1: Are adults more likely to choose to read intrinsic or extrinsic PA messages tailored to each SoC. RQ2: Do people choose to read messages that correspond to their goal orientation and/or SoC. RQ3: In instances where people chose to read a message, is the intrinsic/extrinsic frame of the message related to individuals' decisions to complete a behavior change task embedded within the message? RQ4: Does the fit between the message and one's goal orientation or SoC play a role in their decision to do the behavior change task within the message? RQ1 was tested to provide empirical evidence for message senders who are interested in developing content for a broad appeal, particularly when faced with limited resources. RQ2 was assessed to advance the literature in testing the Fit Perspective in relation to one's intrinsic or extrinsic goal orientation as well as their SoC. Lastly, the focus on participants decision to complete behavior change tasks within a message was an important consideration in RQ3 and RQ4 as behavior change techniques serve as a valuable tool in facilitating positive behavior change (Howlett et al. 2019), and many credible organizations are already integrated similar tasks into their PA promotion messages (Centre for Active Living). Based on previous research (Pope Pelletier & Guertin 2021) of adults' preferences of messages, it was anticipated that participants would be more likely to choose to read intrinsic rather than extrinsic messages (RQ1), and less resistant to the information, thus increasing the likelihood they would opt to do the task (RQ3). In line with the Fit Perspective, it was anticipated that people would be drawn to and therefore more likely to select messages that align with their goal orientation (RQ2), albeit there is insufficient evidence to hypothesize whether this would influence their decision to carry out the task within the message. Regarding to SOC, the literature has demonstrated that people vary in terms of the processes of changes that they naturally utilize across the SoC. Therefore, although scholars may recommend the information that is most suitable for each SoC, there was insufficient evidence to form a hypothesis on whether people would choose to read (RQ2) or act upon (RQ4) the messages in a predictable manner based on their self-identified SoC. In summary, this study significantly contributes to the literature as it is the first to our knowledge to examine the PA messages people choose to read and act upon through a CMSSBC lens. Additionally, it highlights factors that play a role in people's decisions to choose to read and carry out tasks within informative messages.

Methods

Participants

After reading and agreeing to the terms detailed in the informed consent, individuals were eligible to participate in the study if they met the following inclusion criteria: adults aged 25–65 that indicated they were able to read English fluently. Of the 286 participants that completed the survey, participants were removed because they (a) did not respond to SoC items ($n = 7$) or (b) self-identified in the "habit" stage of

change ($n = 85$).¹ This resulted in a sample of 194 ($n_{male} = 91$; $n_{female} = 103$) adults aged 25 to 65 ($\bar{x} = 39.53$; $SD = 10.80$) years old. Participants self-identified as Caucasian ($n = 170$), Asian ($n = 11$), African ($n = 5$), Aboriginal ($n = 1$), Caribbean ($n = 3$), Hispanic ($n = 1$), or mixed race ($n = 3$). As an indication of social economic status, participants were asked to report their household income, and highest level of education completed. Participants self-reported their household income as follows: $< \$25\,000$ ($n = 25$); $\$25\,000$ – $\$59\,999$ ($n = 52$); $\$60\,000$ – $\$99\,999$ ($n = 57$); $\$100\,000$ – $\$124\,999$ ($n = 24$); $\geq \$125\,000$ ($n = 29$), or they prefer not to disclose ($n = 7$). The highest level of education completed by participants was grade 8 ($n = 3$); high school ($n = 33$), college degree/diploma ($n = 59$), University undergraduate degree/diploma ($n = 48$), or University graduate degree ($n = 49$), with 2 individuals indicating they preferred not to disclose that information. Participants BMI ranged from 12.36–51.02 ($\bar{x} = 28.70$; $SD = 6.26$) calculated using self-reported height and weight. Finally, participants were classified as insufficiently active/sedentary ($n = 77$), moderately active ($n = 32$), and active ($n = 76$) using classifications set out by Godin (2011) on their responses to the moderate and vigorous questions on the Godin Leisure Time Questionnaire (Godin & Shephard 1985).

Goals

The Goal Content for Exercise Questionnaire (GCEQ; Sebire Standage & Vansteenkiste 2008) was used to assess goals for PA, which consisted of five four-item subscales, three represented intrinsic goals (social affiliation, skill development and health management), and two denoted extrinsic goals (social recognition and image). Example items of each subscale are as follows: social affiliation – to connect with others in a meaningful way; *skill development* – to acquire new physical activity skills; *health management* – to improve my overall health; *social recognition* – to gain favorable approval by others; and *image* – to improve my appearance. Participants were asked to indicate how important the goals identified in the 20 items were using the 7-point Likert response scale (1 = *not at all important*; 4 = *moderately important*; 7 = *extremely important*). Similar to other studies (Gunnell et al. 2014), the scale was modified from the original by replacing the word “exercise” with “physical activity” to more accurately represent the intended context. The original development and psychometric testing of the GCEQ (Sebire Standage & Vansteenkiste 2008) supported the 2-factor (e.g., intrinsic and extrinsic goals) higher order structure with five lower order factors, and provided evidence of external validity, temporal stability, gender invariance, and internal consistency. Consistent with previous research (Sebire Standage & Vansteenkiste 2008), we averaged the corresponding subscale scores to derive a composite score of intrinsic goals (social affiliation, $\alpha = .90$; skill development, $\alpha = .89$; health management, $\alpha = .85$), and extrinsic goals (social recognition, $\alpha = .91$; image, $\alpha = .87$), thus resulting in composite mean scores for each participant ranging from one to seven.

Stages of change

Adapted from the nutrition context (Guertin Pope & Pelletier 2020) SoC for PA was measured with a six item instrument following the conceptualization outlined in the CMSSBC (Pope Pelletier & Guertin 2018). One item represented each SoC: *detection* (I am trying to decide if I should be physically active), *decision* (I am debating whether I am going to start being physically active), *implementation* (I want to learn more about how (when, where, with whom) to be physically active), *maintenance* (I want to learn more about things I can do to make regular physical activity part of my lifestyle), and *habit* (Regular physical activity is already part of my lifestyle). First, participants were presented with the stem “Please indicate how frequently the thoughts represented in each statement currently cross your mind”, followed by the five items, alongside the Likert-scale response options ranging from 1 (*never*), to 4 (*sometimes*), to 7 (*always*). Thereafter, participants were prompted to choose the one statement that best applies to their current situation regarding PA, followed by the five items listed thereafter. In the nutrition context, these items (Guertin Pope & Pelletier 2020) were associated with self-determined motives, healthy eating and unhealthy eating in the expected direction – providing evidence of criterion validity. The final items were approved of the authors of the CMSSBC, supporting the face validity of these items. Findings from the present study provide evidence of convergent validity as the data conform to a simplex-ordered correlation structure, with items more proximally located demonstrating stronger bivariate correlations than those more distal (see **Table 1** for bivariate correlation scores).

¹ Participants who did not respond to all SoC items were removed from the sample because the SoC items served as central independent variables that were represented by single items. Because these participants represented just over 2% of the participants, it is unlikely that the removal of these participants influenced the results. Additionally, participants who self-identified in the habit stage were removed because messages were not designed for these individuals following Pope et al.'s (2018) conceptualization that individuals at this SoC have already integrated PA activity in their regular lifestyle and no longer require informative messages.

Table 1: Difference Between Participants of Varied Goal Orientations on Message Selection.

Message	Fit % (#)	Did Not Fit % (#)	Difference in Proportion	Chi-squared (df)	p-value
DET_IM	67.36% (64)	32.63% (31)	0.34	5.69 (1)	p = .017
DET_EX	55.56% (25)	44.44% (20)	0.11	4.96 (1)	p = .026
DEC_IM	68.89% (62)	31.11% (28)	0.38	7.10 (1)	p = .008
DEC_EX	57.89% (24)	42.10% (33)	0.16	9.24 (1)	p = .002
IMP_IM	70.00% (56)	30.00% (24)	0.40	7.09 (1)	p = .008
IMP_EX	70.83% (17)	29.17% (7)	0.41	9.90 (1)	p = .002
MAIN_IM	71.62% (53)	28.37% (21)	0.43	8.16 (1)	p = .004
MAIN_EX	48.21% (27)	51.79% (29)	0.04	1.58 (1)	p = .209

Note: Difference in proportion was calculated by subtracting column 3 from column 2.

Messages

Eight 4-page PA promotion messages were created for this study and were approved by two authors of the guiding conceptualization (Pope Pelletier & Guertin 2018), including: *Intrinsic-Detection* (S.A1), *Intrinsic-Detection* (S.A2), *Intrinsic-Implementation* (S.A3), *Intrinsic-Maintenance* (S.A4), *Extrinsic-Detection* (S.B1), *Extrinsic-Detection* (S.B2), *Extrinsic-Implementation* (S.B3), and *Extrinsic-Maintenance* (S.B4). All messages used the same formatting, font style and size, and presented images in a similar manner (e.g., on the first page, messages featured an image faded into the background at the same level of transparency, displaying a person at a similar close up, that occupied a similar amount of space on the page). Intrinsic messages emphasized elements like health, fun, enjoyment, and personally meaningful outcomes. In contrast, extrinsic messages accentuated physical appearance, social and self-imposed pressure, and ego-enhancement. Following the demographic and psychological questionnaires, the first page of all eight messages were presented randomly across participants. Participants were prompted with the instructions to “select the message(s) that you wish to read” and informed that they could select as many messages as they wished. Thereafter, for every message a participant chose to read, the entire 4-page message was displayed in the subsequent section.

Option to complete behavior change task

For every message that participants selected to read, they were afforded the opportunity to complete a behavior change task embedded within the 3rd page of the message. Specifically, following the third page of the message, participants were prompted with the question “If you would like to complete the activity above, please select yes”, and were presented with a fillable activity section if they indicated “yes”. The behavior change task emphasized within each message included, self-reflection (detection), goal setting (decision), action planning (implementation) and coping planning (maintenance; Pope Pelletier & Guertin 2018).

Manipulation check

To ensure that participants perceived the messages according to the frame and SoC they were intended to represent, a manipulation check similar to that used by Pope and Pelletier (2021) was performed. Following each message, participants were asked to indicate the extent to which the message they read emphasized information that represented *intrinsically framed content* (enjoyment, interest, personal challenge, personal development, health, OR connecting with significant others), *extrinsically framed content* (appearance, appealing to others, pressure from others, avoiding feelings of guilt or shame, OR attaining feelings of work), the *detection SoC* (problems associated with physical inactivity OR how the benefits of physical activity are important or relevant to you), the *decision SoC* (information that will help you decide what physical activities you can do OR helps you create a physical activity goal), the *implementation SoC* (information that helps you turn your physical activity goals into action OR helps you decide when, where, and with whom you will do the activity), and the *maintenance SoC* (information that helps you learn how to sustain physical activity engagement over time by overcoming barriers and obstacles you may face). Only the description contained within the brackets (rather than the descriptive word such as detection SoC) was presented to participants with a 7-point Likert response scale that ranged from 1 (not at all) to 7 (completely). On average, participants scored these messages 4.76/7.00 (ranging from \bar{x} = 3.68; *SD* = 1.73 to \bar{x} = 5.26; *SD* = 1.68) for the frame it

was intended to represent, and 5.25/7.00 (ranging from $\bar{x} = 4.61$; $SD = 1.80$ to $\bar{x} = 5.65$; $SD = 1.30$) for the SoC they were designed to represent. Further inspection of the data demonstrated that each message was perceived to represent the intended frame and SoC significantly more so than the messages designed to depict the opposing frame or alternative SoCs.

Procedures

Following ethics approval at the host University [#2017–029], participants were recruited to participate in an online survey hosted on QualtricsSM Survey Software using Amazon Mechanical Turk ($n = 127$) or through social media ($n = 67$; e.g., Facebook or e-mail). Amazon Mechanical Turk is a crowdsourcing website that allows businesses or researchers to ask “crowdworkers” to complete online tasks for a fee. Upon completion of the survey, all participants were paid \$8 for their contributions to the study.

Data Analyses

Data analyses proceeded in five steps. First, data were inspected for missing values for the goal items (0.27% of the goals data was missing with zero to two responses missing for each item). Means scores were manually computed by averaging remaining corresponding goal subscale item responses and replacing them accordingly. Second, Cronbach alpha scores and descriptive statistics were computed. Third, a series of four (one for each SoC) McNemar's tests (McNemar 1947) were performed to compare the proportion of participants who chose to read each message type (intrinsic versus extrinsic). A p -value less than 0.05 on the McNemar test implied there was a significant difference in the proportion of participants that selected intrinsic versus extrinsic messages. Fourth, eight (one for each message) Chi-square test for homogeneity (Tests of Two Proportions in SPSS) were conducted to analyze the proportion of participants who selected to read messages that fit their goal orientation, followed by their SoC. In instances when sample size was too small, Fisher's exact test was used. Similar to the McNemar test, a p -value less than .05 denoted a significant difference in message selection based on whether the message did or did not fit the goal orientation/SoC of the participant. For the analyses testing the goal orientation, a composite score was computed (composite mean score for intrinsic goals – composite mean score for extrinsic goals), with participants scoring greater than zero classified in the intrinsic group, and those less than zero in the extrinsic group. In relation to the SoC, participants self-selected SoC (where participants selected the SoC that most accurately represented them) was used in these analyses such that if the SoC of the participant matched the SoC of the message, the data was coded to have a “fit”(coded as 1; e.g., participants that selected the decision item were coded 1 on the decision messages), and categorized as “did not fit” (coded as 0) if their self-selected SoC did not correspond to the SoC of the message (e.g., participants that selected the decision item were coded 0 on the implementation messages).

Finally, four stepwise binomial regressions were conducted to test RQ3 and RQ4 to determine the factors that contributed to the likelihood that participants completed the behavior change task embedded within the message. With only 20 to 78 participants (varied across the eight messages) choosing to read the messages, and thus being presented with the option to complete the task contained in it, data were analyzed at the aggregate level, with all messages grouped into one analysis. When interpreting the data, please note that the data was coded in the following manner: Message Order (1 represented the first message they read, and it increased thereafter), message frame (1= intrinsic, 2 = extrinsic); Message SoC (1 = detection; 2 – decision; 3 – implementation; 4 – maintenance). Additionally, in the first, third, and fourth binomial regression, the composite score (ranging from 1–7) for intrinsic as well as extrinsic goal orientation was used. In the second binomial regression, the variable “FitSoC” was derived by organizing participants' SoC Likert response scores for the corresponding messages into 1 column (e.g., for implementation messages, participants responses to the implementation Likert based item were reported, while participants decision Likert responses were included for the decision messages). After organizing the data as stated, assumptions were tested, and data analyses proceeded as all assumptions were met. All analyses were performed using SPSS Version 26.0.

Results

Descriptive statistics

When prompted to select the most representative SoC, 12 participants selected the detection SoC, 29 chose the decision SoC, 53 picked the implementation SoC, and 100 selected the maintenance SoC. Participants were also asked to respond to each SoC using a Likert-scale, which resulted in the following scores: detection ($\bar{x} = 4.07$; $SD = 1.75$), decision ($\bar{x} = 4.59$; $SD = 1.45$), implementation ($\bar{x} = 5.07$; $SD = 1.24$), maintenance ($\bar{x} = 5.13$; $SD = 1.57$), and habit ($\bar{x} = 3.22$; $SD = 1.54$). In relation to goal orientation, 144 participants were

classified as having an intrinsic orientation, while 80 were labeled with an extrinsic orientation, with overall scores for intrinsic goals ranging from 1.00–7.00 ($\bar{x} = 4.42$; $SD = 0.99$), and 1.00–7.00 ($\bar{x} = 4.16$; $SD = 1.24$) for extrinsic goals.

Comparing intrinsic versus extrinsic message selection

Findings illustrated that the proportion of participants that choose to read intrinsically framed messages was significantly higher than those who selected to read extrinsically framed messages, including messages tailored to the detection (intrinsic: 48.97%; extrinsic: 23.20%; $\chi^2 (1) = 24.01, p < .001$), decision (intrinsic: 46.39%; extrinsic: 29.38%; $\chi^2 (1) = 10.14, p < .001$), and implementation SoC (intrinsic: 41.24%; extrinsic: 12.37%; $\chi^2 (1) = 36.01, p < .001$), but not the maintenance SoC (intrinsic 38.14%; extrinsic 28.86%; $\chi^2 (1) = 3.14, p = .076$).

Difference between goal orientations for message selection

The eight Chi-square Test for Homogeneity demonstrated that for all but the extrinsic-maintenance message, the proportion of participants that chose to read the messages was significantly higher when the goal orientation of the participant fit the message frame (e.g., participants with an intrinsic goal orientation – intrinsically framed message) in comparison to when the participants goal orientation did not fit the message frame (e.g., participants with an extrinsic goal orientation – intrinsically framed message). See **Table 1** for a detailed illustration of the results.

Difference between SoC on message selection

Chi-squared tests for homogeneity in relation to SoC message fit showed no significant differences between participants that fit and did not fit the message with the exception of the detection-extrinsic message (*detection-extrinsic* – fit 0%; did not fit 26.22%; Fisher's Exact Test; $p = .041$) which should be interpreted with caution due to the violation of sample size requirements.

Predicting the likelihood participants will do the activity

The first multi-step binomial logistics regression was conducted to examine the role of message SoC and participants fit between their SoC and that of the message. A detailed depiction of the findings is presented in **Table 2**. Inspection of the odds ratio score in the final model illustrated that for every additional message presented to the participants, they were 2.43 (1/0.41) times less likely to choose to do the activity within the message, however the SOC of the message and fit of message SOC to the participants SOC did not play a significant role in whether they chose to do the activity.

The second regression detailed in **Table 3** examined the contributions of message frame and participants' intrinsic and extrinsic goal orientation in explaining the likelihood participants complete the task within

Table 2: Predicting likelihood of Completing Task Considering Message SoC and Participants Fit with Message SoC.

Model	Order	Message SoC	SoC Fit	χ^2	R^2	PAC
0						58.9
1	70.82***; 0.41 [0.33–0.50]			97.88***(1)	.23	69.1
2	64.88***; 0.42 [0.34–0.52]	0.64; 1.07 [0.90–1.28]		98.52***(2)	.23	69.1
3	65.84***; 0.41 [0.33–0.51]	0.56; 1.07 [0.90–1.28]	1.81; 1.16 [0.93–1.45]	100.34***(3)	.24	68.2

Note: Columns two through four represent the independent variables entered and are explained as follows: Order refers to the order in which each participant was presented with the message; Message SoC reflects the SoC the message was tailored to; SoC fit depicts participants fit with the corresponding message. Within each Independent variable column, the Ward test statistic was presented first, followed by the Odds Ratio score, with the confidence interval in []. R^2 represents the explained variation in the likelihood participants choose to do the activity based on the independent variables included in the model using Nagelkerke R^2 . PAC represents the percentage accuracy in classification which denotes the percentage of participants that could be correctly classified (choosing to do the activity or not) based on the independent variables included in the model. Significance was illustrated as follows: * $p < .01$, ** $p < .05$, *** $p < .001$.

Table 3: Predicting likelihood of Completing Task Considering Message Frame and Participants Goal Orientation.

Model	Order	Frame	Intrinsic	Extrinsic	X ² (DF)	R ²	PAC
0							58.9
1	70.81***; 0.41 [0.33–0.50]				97.88***(1)	.23	69.1
2	68.81***; 0.41 [0.37–0.52]	1.31; 1.26 [0.96–1.88]			99.19***(2)	.23	69.1
3	71.16***; 0.40 [0.32–0.49]	1.10; 1.26 [0.82–1.93]	4.86**; 1.33 [1.03–1.72]	0.43; 0.93 [0.76–1.15]	104.71***(6)	.25	69.1

Note: Columns two through five represent the independent variables entered and are explained as follows: Order refers to the order in which each participant was presented with the message, Frame reflect to the message frame, and Intrinsic and Extrinsic represent the goal orientation scores of participants. Within each Independent variable column, the Wald test statistic was presented first, followed by the Odds Ratio score, with the confidence interval in []. R² represents the explained variation in the likelihood participants choose to do the activity based on the independent variables included in the model using Nagelkerke R². PAC represents the percentage accuracy in classification which denotes the percentage of participants that could be correctly classified (choosing to do the activity or not) based on the independent variables included in the model. Significance was illustrated as follows: * $p < .01$, ** $p < .05$, *** $p < .001$.

the message. The odds ratio score in Model 3 illustrated that for every additional message presented to the participants, they were 2.50 (1/0.40) times less likely to choose to do the activity within the message. Further, it was reported that participants were 1.33 times more likely ($p < .05$) to do the activity when they scored 1 point higher in terms of their intrinsic goal orientation in the final model.

While this is informative, we further split the data based on the message frame (intrinsic and extrinsic frame) to perform two additional binomial regressions in an attempt to address RQ4, with message order (Model 1), intrinsic goals (Model 2) and extrinsic goals (Model 2) entered in the two models. Findings indicated that only message order (Wald statistic = 39.13, $p < .001$; odds ratio = .45[.35 – .58]) served as a significant predictor of decision to complete the activity in intrinsic messages; $\chi^2(3) = 53.96$, $p < .001$, Nagelkerke R² = .20; PAC = 68.1% in Model 2. Interestingly, intrinsic goals emerged as a significant factor in the extrinsic model (Model 2), suggesting that participants were 1.65 times more likely ($p < .05$) to do the activity within the extrinsic message when they scored 1 point higher in intrinsic goals; while message order again served as a significant factor (Wald statistic = 32.47, $p < .001$; odds ratio = .31[.21 – .46]); $\chi^2(3) = 48.99$, $p < .001$, Nagelkerke R² = .32; PAC = 69.2%.

Discussion

The purpose of the present study was to explore adults' preferences for and engagement with PA messages framed and tailored using the CMSSBC, while accounting for the goal orientation and SoC of the individual. One objective of the study was to determine if adults were more likely to read intrinsic or extrinsic PA messages. Further, this study examined whether the frame of a message played a role in whether participants were more likely to decide to complete a behavior change task contained within the message after selecting to read it. Results demonstrated that participants were more likely to choose to read intrinsic over extrinsic PA messages, yet the frame of the message did not play a significant role in participants' decision to do the task when personal characteristics were not considered. This research supports the superiority of utilizing an intrinsic frame as advocated in the CMSSBC (Pope Pelletier & Guertin 2018) and existing literature (Pope & Pelletier 2021; Vansteenkiste et al. 2007; Vansteenkiste et al. 2005; Vansteenkiste et al. 2004; Vansteenkiste et al. 2008) that has compared intrinsic to extrinsic messages when participants are not afforded a choice. These study findings suggest that when given the option, adults are more likely to choose to read messages (but not necessarily more likely to engage with them) when they emphasize goals and reasons for engaging in PA such as enjoyment, health, personally valued benefits, and meaningful connections with others. This is critical to understand because if someone does not want to – or chooses not to – read a PA message, the content within it is of minimal value, and cannot be used to alter how they think or feel about PA, or PA behaviors.

To answer our research questions pertaining to the fit perspective, we tested (a) whether participants were more likely to choose to read PA messages that matched their goal orientation and (b) if their goal orientation played a role in their decision to complete behavior change tasks within messages. Results indicated that participants were more likely to choose to read messages that “fit” their goal orientation – thus supporting the fit perspective. In contrast, the analyses of the behavior change task did not support

this assertion. In fact, when separate analyses were performed for intrinsic and extrinsic messages, the only significant finding pertaining to goal orientation indicated that individuals were significantly more likely to decide to do the task within the extrinsic messages when they had a higher intrinsic goal orientation toward PA. In other words, although participants were more likely to choose to read a message that corresponded to their goal orientation, participants with an intrinsic goal orientation were more likely to engage in behavior change task even when they decided to read an extrinsically framed message. This research contributes to the limited and inconsistent evidence (Lee & Pounders, 2019; Vansteenkiste et al., 2008) examining the benefits and drawbacks of fitting messages to message recipients goal orientation. While we advise this research be interpreted with caution, it suggests that if the necessary resources are available, it may be advantageous to tailor messages to one's goal orientation in order to increase the chances the material will be read, which is essential for fostering physical activity changes. However, longitudinal research that fits extrinsic messages to individuals with extrinsic goal orientation must be conducted to determine if the benefits of matching this goal orientation outweighs the deleterious outcomes that have been associated with extrinsic messages (e.g., social comparison, ego orientation, and reduced commitment; Vansteenkiste et al. 2007; Vansteenkiste et al. 2005; Vansteenkiste et al. 2004; Vansteenkiste et al. 2008).

The remaining research questions tested whether adults were more likely to read messages and choose to complete tasks within messages that corresponded to their self-selected SoC. Opposite to the goal orientation results, these findings demonstrated that the fit between the PA message and SoC of the participants was not a significant factor in their decision to read the message. This may suggest that people don't naturally choose to read information that is conceptually geared to them or perhaps most beneficial for their progression toward a more physically active lifestyle. As such, it may be advantageous to guide people toward the most appropriate messages as opposed to providing complete autonomy in their selection when delivering information – such as a PA promotion program. Although speculative in nature, one potential explanation for this finding is that people may gravitate toward information that reinforces prior knowledge (e.g., information tailored to an earlier SoC than their self-identified SoC) as a mechanism to enhance feelings of competence, rather than knowledge they may lack, but could benefit from. For example, people in the implementation stage may choose to read messages that emphasizes the formation of goals (e.g., decision SoC) because it reinforces the intentions they have already formulated and boosts their feelings of competence by doing so. Researchers should therefore consider conducting future studies that examine the effect of free choice versus assigned messages on one's thoughts, feelings, and behaviors. In relation to participants decision to do a behavior change task, it was reported that the degree to which participants fit the SoC of the corresponding message did not significantly influence their decision to do the task.

Like any study, this research was subject to several limitations. First, despite attempts to include a diverse sample, self-selection bias was likely a factor, with the study comprised of many Caucasians, active individuals, and adults that represented later stages of change. Future research should therefore consider assessing these variables in the screening process and excluding participants once saturation is reached for certain characteristics. Second, this study used self-reported measures and therefore social desirability may have occurred. The online anonymous study design, alongside encouragement to answer honestly without judgement was utilized to diminish this bias. Additionally, the psychometric properties of the SoC scale utilized in this study has been minimally tested. To address this, the face validity and convergent validity of this scale was tested in the present study, but we encourage scholars to more rigorously test this scale in the future. Another limitation was that the order in which participants viewed the messages once they selected to read them was not randomized. The order in which they were presented with the opportunity to complete the activity was therefore dependent on the messages they chose to read. To rectify this situation, we controlled for this in the binomial regression analyses. Finally, due to the nature of this study, only participants who chose to read the message were presented with the option to do the behavior change task. Therefore, only 20–78 participants (depending on the message) were provided with the option to do the task within each message, which resulted in us aggregating the data across all messages. As a result, it is plausible that the study findings could have varied if all participants were given the option to complete the tasks, as we could assume they are less likely to do the activity if they choose to not read it in the first place. Albeit, it would be a large burden to ask participants to read all eight messages.

Conclusion

In summary, this study highlights that adults – at least the participants in the present study – naturally gravitated toward intrinsically framed PA messages. Combined with the advantageous outcomes linked to intrinsic messages, it offers additional evidence that message designers should emphasize activities and exercise modalities that people enjoy, striving to challenge oneself or hit personal bests, and benefits

of physical activity that the message recipient personally values to broadly appeal to adult populations. While this study indicated that people may be more drawn to messages that fit their goal orientation, we suggest that further research be conducted before message designers exert additional resources tailoring PA messages to one's goal orientation – particularly extrinsic orientation – which is generally linked to more deleterious outcomes.

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Competing Interests

The authors have no competing interests to declare.

Reference


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