

A Quantitative Study of Motivational Reminder Model in Health Game

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Abstract

Motivation is a promising method to cultivate new healthy behaviour among older adults. Motivational Reminders take a goal-oriented approach to the stages of internalization highlighted in the Organismic Integration Theory, and proposes various messaging approaches to help remind and internalize new healthy behaviour. Throughout this internalization process, various forms of motivation are introduced at different stages, ranging from extrinsic motivation to self-determined motivation. A quantitative study was conducted to evaluate and validate the effectiveness of Motivational Reminders in health game, in terms of improving adherence rate, increasing intrinsic motivation and shifting individuals to the more autonomous side of the internalization continuum. Study results concluded that the implemented motivational reminders according to the proposed model is effective in facilitating internalization which led to improved adherence rate of playing health game.

Keywords: motivational reminder, self-determination theory, health game, motivation experience

I. Introduction

Motivation plays a key role in inducing and maintaining new healthy behaviour. Motivation is the universal drive of an individual to internal or external stimuli that generates attention, interest and subsequently, action among individuals. Motivation can be broadly categorized as intrinsic and extrinsic. Intrinsic motivation involves doing something that is interesting, enjoyable and internally rewarding, whereas extrinsic motivation occurs for instrumental reasons, such as monetary or tangible rewards [1]. While extrinsic motivation easily creates short-term benefits [2], it struggles to create persistent behaviour change; whereas intrinsic motivation is more enduring [3], but is harder to induce.

Another challenge of maintaining a new healthy behaviour is in ensuring it is consistently remembered and carried out. Activities such as exercising and taking medications can be hard to upkeep, especially when individuals lack the motivation to adhere to scheduled activities. As literature has put it, forgetfulness may be genuinely unintentional or partly intentional [4] due to amotivation. State-of-the-art reminders focus on mobile apps [5] that provide a wide variety of features [5]. In this regard, the design of reminder messages could utilize both extrinsic and intrinsic motivation in order to obtain the best of both worlds when attempting to cultivate new healthy behaviour, adding motivation to reminders to perform common health activities.

The Organismic Integration Theory (OIT) proposed by Deci and Ryan [6] is helpful in examining the extrinsic/intrinsic forms of motivation. By laying out the extrinsic-intrinsic duality on a continuum, the OIT suggests that 4 stages are present in the process of transforming externally regulated new habits into integrated parts of one's own identity. Such process is described using the word *internalization*.

Applying OIT to craft reminder messages guides a converging pattern of message contents: In the first 2 stages, messages are composed primarily with various psychological rewards. Whereas in the later 2 stages, health values start to surface, and reminders attempt to get subjects to acknowledge and accept the end goal of the healthy activity. In a prior publication [7], the author has proposed Motivational Reminders that take various goal-oriented approaches to help individuals transit along the stages of internalization, allowing quicker and more successful conversion of extrinsic motivation into intrinsic motivation. Figure 1 provides a visual summary of various proposed messaging approaches that can be used to craft reminders that induce the next internalization stage.

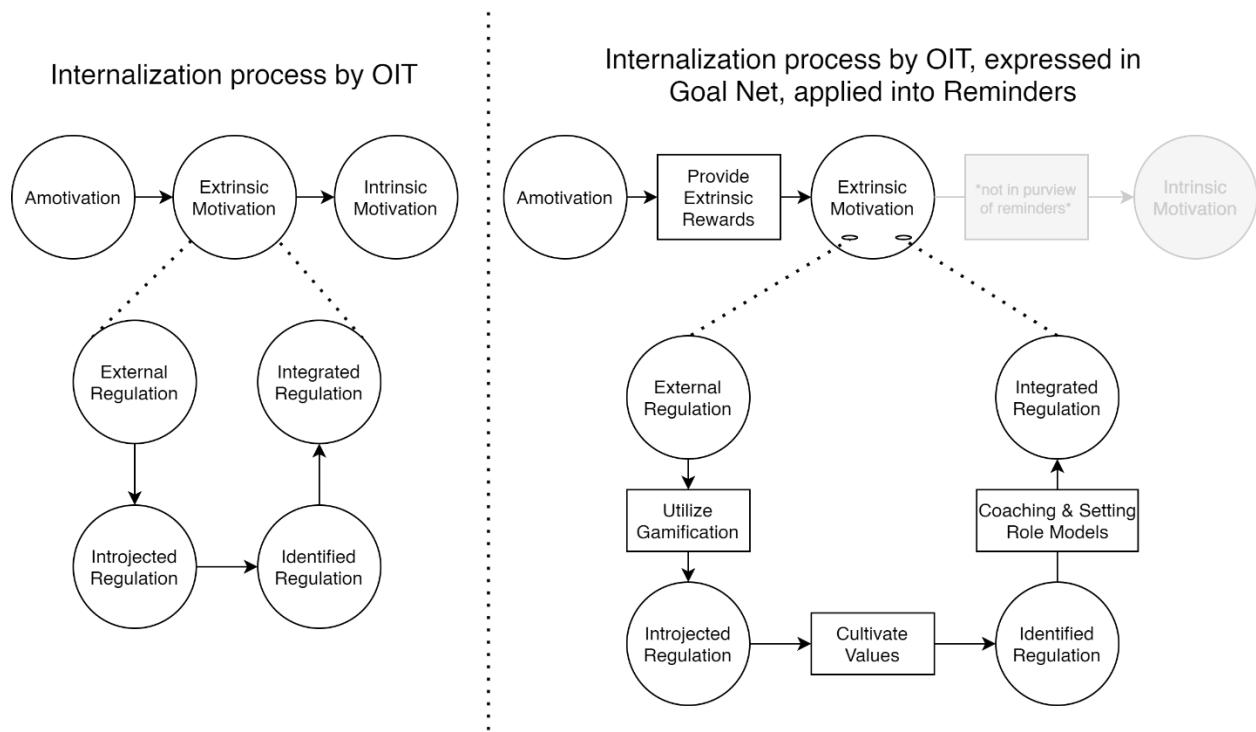


Figure 1. Summary of Internalization-Facilitating Approaches in Motivational Reminders

Hence, this article presents follow-up study to implement Motivational Reminders and evaluate its promising effects to facilitate internalization and enhance adherence to new healthy behaviour.

II. Implementing and Evaluating Motivational Reminders

The quantitative study was designed to evaluate the effectiveness of the proposed Motivational Reminders (MR). In this study's case, MR is hypothesized to generate better adherence to a regular schedule of playing short segments of health games among older adults. The health game selected for use in this study is Pumpkin Garden, which is used for Parkinson's Disease early detection [8].

A. Study Procedures

45 participants above the age of 50 were recruited and randomly divided into 3 different groups: the control group, the Untargeted Motivational Reminder group (UMR group), and the Motivational Reminder group (MR group), with each group consisting of 15 participants. Before the participants proceeded the gameplay study, participants filled in the Behavioural Regulation in Exercise Questionnaire (BREQ-2) questionnaire which reveals their current stage in internalizing the behaviour of playing health games regularly.

Participants were then briefed on risks of Parkinson's Disease among their population. They were introduced to the Pumpkin Garden Health Game, a serious game aimed at early detection of PD symptoms [8]. Aside from Pumpkin Garden game's health benefits, participants were also told from the start that they will be rewarded with several bottles of hand sanitizers at the end of the 1-week study, depending on how many times they followed the reminders. The reward in the form of hand sanitizers represents the main extrinsic motivator¹ for adhering to their gameplay schedule. On the other hand, the health benefits presented in the briefing represents the more intrinsic motivator for health game adherence.

¹ The study was conducted in Singapore during March 2020, a period when hand sanitizers are in high demand especially among older adults. Thus it is fair to consider hand sanitizers to be a compelling extrinsic reward.

During the study, reminders were sent to the participants twice per day, at 11am and 7pm, for a total of 7 consecutive days in the form of a notification issued by the Motivational Reminder Application developed for this study. They are then expected to respond to the periodic reminders within 2 hours by playing a short 30-second Pumpkin Garden game segment. Participants' adherence to this gameplay schedule (i.e. whether they have responded to the reminder and played the game) was recorded through the Motivational Reminder Application itself. After the 7th day, participants fill in the BREQ-2 questionnaire again to measure if they have progressed to subsequent internalization stages. The Intrinsic Motivation Inventory (IMI) is also filled in to compare levels of intrinsic motivation between the 3 groups.

Table 1 summarizes the study procedures elaborated above. Details differentiating the messages received by control, UMR and MR groups are elaborated in the next section.

Table 1. Study Procedures

| Steps | Control Group | Untargeted Motivational Reminder (UMR) Group | Motivational Reminder (MR) Group |
|--------------|--|--|---|
| 1. | Introduction of Pumpkin Garden Health Game | | |
| 2. | Pre-study to fill in BREQ-2 | | |
| 3. | 7-day of gameplay with general reminder | 7-day of gameplay with messages randomly selected from a pool of pre-crafted messages. | 7-day of gameplay with messages from specific message pools, based on their current internalization stage |
| 4. | Post-study to fill in both IMI and BREQ-2 | | |

B. Implementing Motivational Reminders

Different participant groups received different reminder messages throughout the study. The control group received the same message every time: "Time to play the Pumpkin Garden game!",

Whereas both UMR and MR groups received messages randomly selected from a pool of pre-crafted messages. Four message pools are defined to facilitate 4 different transitions between 5 internalization stages:

Table 2. Different Pools of Messages to Facilitate Different Transitions

| Message Pool Name | Transition to Facilitate | Messaging Approach |
|------------------------|--|--|
| msg_AMOT (Amotivation) | Amotivation → External Regulation | Obtain Adherence via Extrinsic Rewards |
| msg_EXT (External) | External → Introjected Regulation | Gamification |
| msg_IJ (Introjected) | Introjected → Identified Regulation | Cultivate Values |
| msg_ID (Identified) | Identified → Integrated / Intrinsic Regulation | Coaching |

Pre-crafted messages in each pool follow a messaging approach, as proposed in the author’s prior publication on Motivational Reminders [7]. The 4 messaging approaches were refined to suit the context of this study, where the extrinsic reward is hand sanitisers while the intrinsic reward is Pumpkin Garden’s health values (i.e. early detection of Parkinson’s Disease symptoms [8]). Each messaging approach and its corresponding Motivational Reminder messages are presented:

1. Obtain adherence – use tangible rewards to create external regulation for amotivated individuals.

For amotivated participants, reminders highlight that if they adhere to their gameplay schedule, they will get additional sanitiser rewards at the end of study. The opposite is true; they are also reminded that they will get less rewards if they do not follow the reminders. The full message pool to shift participants from Amotivation to External Regulation (*msg_AMOT*) is as follows:

- Play the game now to receive 1 more bottle of sanitizer at the end of study!

- You earned X bottles of sanitizers so far, play now and get up to Y!
- You will not get any rewards if you don't follow the schedule at least X times.
- You need X more game to be eligible for the first 2 sanitizer bottles.

(X and Y are variables which are dependent on participants' performance)

2. Utilize gamification to improve *task relatedness*: reward scores, badges and achievements to players who performed well in adhering to the reminders.

For participants motivated by external regulation, motivational reminders attempt to increase their esteem by using gamified elements such as Adherence Scores, Combo streak, and continuous progress updates on how far the user is to reach the next achievement. These psychological rewards attempt to stimulate participants' relatedness towards the task of playing the game on time. Two types of achievements with three tiers are designed for this type of reminders:

- Completionist: complete your 1st / 6th / 12th game
- Perfectionist: play 3 / 7 / 11 games in-a-row

The full message pool to shift participants from External Regulation to Introjected Regulation (*msg_EXT*) is as follows:

- You have achieved Perfectionist-BRONZE for adhering to your gameplay 3 times in a row!
- Stick to your gameplay schedule 2 more times to unlock the Completionist-GOLD award!
- One game left for your Perfectionist-GOLD award, you will be the first to get it!

- Unlocking Perfectionist-SILVER puts you among the top 10%, keep going!

(Achievements are specific to participants' performance; player position on leaderboard are presented to encourage players)

3. Cultivate values to promote *task importance* – educate users to understand the values behind their actions.

For participants who are under introjected regulation, messages should present health facts about the Pumpkin Garden Health Game. More attention is directed towards valuing their Parkinson's Disease risk instead of the extrinsic rewards. The full message pool to shift participants from Introjected Regulation to Identified Regulation (*msg_IJ*) is as follows:

- Check on your PD risk by playing the Pumpkin Garden game.
- X% among your age group is at risk of PD, play to find out if you are at risk.
- Play regularly to get more accurate PD diagnosis results!
- The game can improve your coordination skills, play now!
- Your health is important, don't forget to play consistently!

4. Coaching – help users integrate their motivation by showing them how to do it.

For participants who have achieved identified regulation, messages need to occasionally “paint a role model” and utilize coaching methods to drive the user towards the role model. In the case of our study where the activity is short and simple, and the main goal is to achieve the highest possible adherence score. Reminders at this stage should remind the player their achievable best score, and provide tips on ideal ways to play to result in PD reports that reports low risk of PD. The full message pool that aims to shift participants from Identified Regulation to Integrated Regulation (*msg_ID*) is as follows:

- 2 days left, keep going to achieve your best score of 12!
- Keep your movement circular; it produces more accurate PD health reports.
- You want to do better, stick to your scheduled games and you will improve!
- It's ok that you have missed a game, it's not too late to get back on track!
- It is unlikely you have PD, show it by completing the game!

Motivational Reminders containing these messages are presented to both MR group and UMR group. In MR group, one of the 4 message pools was assigned to each participant, based on the subscale they scored highest as indicated in the pre-study BREQ-2 questionnaire. They will then only receive messages randomly selected from this message pool, as the messages aim to facilitate their transition to subsequent internalization stage(s). For example, participants who scored highest in the *Amotivation* subscale before the study will receive pre-crafted messages from the *msg_AMOT* message pool throughout the 7-day study period. On the other hand, the UMR group will receive untargeted messages, randomly selected from a random message pool every time. The UMR group simulates the approach of motivational reminders but without matching the approach with its intended recipient. Thus, it is hypothesized that MR's "targeted content" approach should produce most prominent results in the MR group, out of the three groups. In other words, each approach should only be most effective towards individuals in specific internalization stages.

C. Evaluation Criteria and Tools

Motivational Reminders are expected to perform better than general reminders through better adherence results. It is hypothesized to accomplish the above through facilitating the internalization process. Thus aside from measuring adherence directly, this study also employs tools that measure levels of intrinsic motivation, as well as the different stages of internalization.

Firstly, the adherence score is obtained by counting how many times participants have successfully complied to reminders and played the game. A total of 14 reminders were presented to participants through the 7-day, thus possible scores range from 0 to 14.

Secondly, the Behavioural Regulation in Exercise Questionnaire (BREQ-2) [9] is modified for use in this study² to measure the individual's stage of internalization, both before and after the study. Differences captured by BREQ-2 could highlight whether Motivational Reminders have facilitated internalization towards the new behaviour of playing health games. BREQ-2 with 5 stages (AMOT, EXT, IJ, ID, IM) by Markland and Tobin [9] was selected out from the 3 versions. This is due to a number of reasons:

- Compared to BREQ [10], BREQ-2 contains amotivation as a stage while BREQ does not. Since the study focuses on older adults, amotivation is expected to be a prominent phenomenon for older adult's attitudes towards health games, as not many are affluent with digital games / technology and would have little motivation to engage with it.
- Compared with BREQ-2R [11], BREQ-2 contains more appropriate questions to describe the health game experience in stages with higher levels of internalization. For example, "I play health games because it's fun" can help researchers better understand if participants find the health game intrinsically motivating to play. For comparison, an example of an omitted question from BREQ-2R (from *integrated regulation* subscale) would read as following: "I consider playing health games to be part of my identity". This degree of integration is less likely to be applicable in health games' settings, especially among older adults who do not grow up playing digital games.

² The activity "exercise" is generally replaced with "play health games" in the modified BREQ-2.

The original BREQ-2 also highlights peer pressure as external regulations for exercise behaviour, e.g. “I exercise because my friends/family/spouse say I should.” They have been replaced with the actual extrinsic reward presented in this study, which is the hand sanitizers they are expected to receive after completing the study. For example, “I play health games because I can get rewarded.” The modified BREQ-2 is attached in Appendix A: Modified BREQ-2 used for Study.

Thirdly, 25 items that form the *Activity Perception Questionnaire* were selected from post-experimental IMI [12] to assess participants’ interest/enjoyment, value/usefulness and perceived choice. This version of IMI was theorized to be an effective predictor for the measure of internalizing an activity and has been used in previous studies such as [13].

- *Interest/enjoyment* represents participants’ intrinsic motivation to play the health game. *Fun* and *enjoyment* are recurring words throughout this subscales’ questions as motivators.
- *Value/usefulness* represents the more extrinsic or utilitarian side of motivation. Prominent words in IMI describing this concept include *important*, *improve*, *beneficial*, *has value*.
- *Perceived choice* describes whether participants felt a sense of autonomy when they are reminded to play the health game. Relevant questions revolve around *choice* where phrases like “I had to” is contrasted with “I want to”.

The 25 IMI items have been modified slightly to fit the activity conducted for our study, namely playing the Pumpkin Garden serious game. “Health game” is used to describe the activity participants were asked to do throughout the study. The concepts of “health benefits” and “health improvement” are used to refer to the value / usefulness of health games. An example IMI question used for this study is “*I think this health game is important for improving my health*”. Appendix B: Modified Intrinsic Motivation Inventory (IMI) lists the full questionnaire used in this study.

III. Study Results and Discussions

A. Comparing Adherence Scores

The number of times participants adhere to their gameplay schedule (out of 14 attempts) are summed to form an “adherence score”. The adherence scores of the 15 participants in each group are then averaged to form a group average adherence score. The confidence interval ($\alpha = .05$) is also computed and presented as error bars.

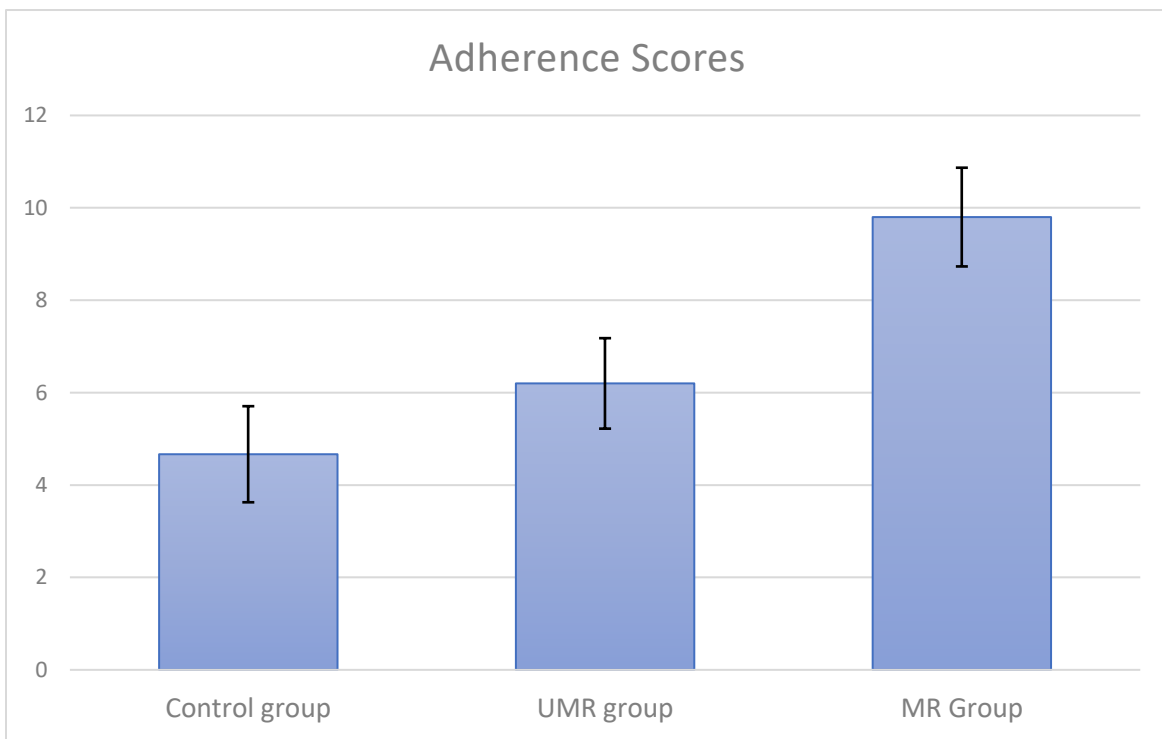


Figure 2. Mean Adherence Scores

There was significant improvement in adherence scores for MR group when compared to control group. Participants who used Motivation Reminders scored an average of 9.8 (± 1.07) while those who used general reminders scored an average of 4.67 (± 1.04). Those who received the Untargeted Motivational Reminders scored slightly better than the control group, at 6.2 (± 0.98). However, UMR group’s improvement does not seem to be as significant as the MR group, which do not have

overlapping error margins with the control group. In addition, the “Mean Difference from MR Group” in Table 3 showed t-test results to signify the adherence score improvements of MR group.

Table 3. Adherence Score Mean Difference t-test

| Group | Mean | Std. Deviation | Mean Difference from MR Group |
|---------------|------|----------------|-------------------------------|
| Control group | 4.67 | 2.127 | 5.133** |
| UMR group | 6.20 | 1.935 | 3.6** |
| MR group | 9.80 | 2.111 | - |

**t-test is significant at the 0.01 level (2-tailed)

B. IMI for Comparing Intrinsic Motivation

The *Activity Perception Questionnaire* under IMI is used to measure the level of Intrinsic Motivation at the end of the 7-day study. The 3 subscales that are administered include interest/enjoyment, value/usefulness and perceived choice. All questions are scored on a 7-point Likert scale. Each IMI subscale score is averaged by participant group and then compared.

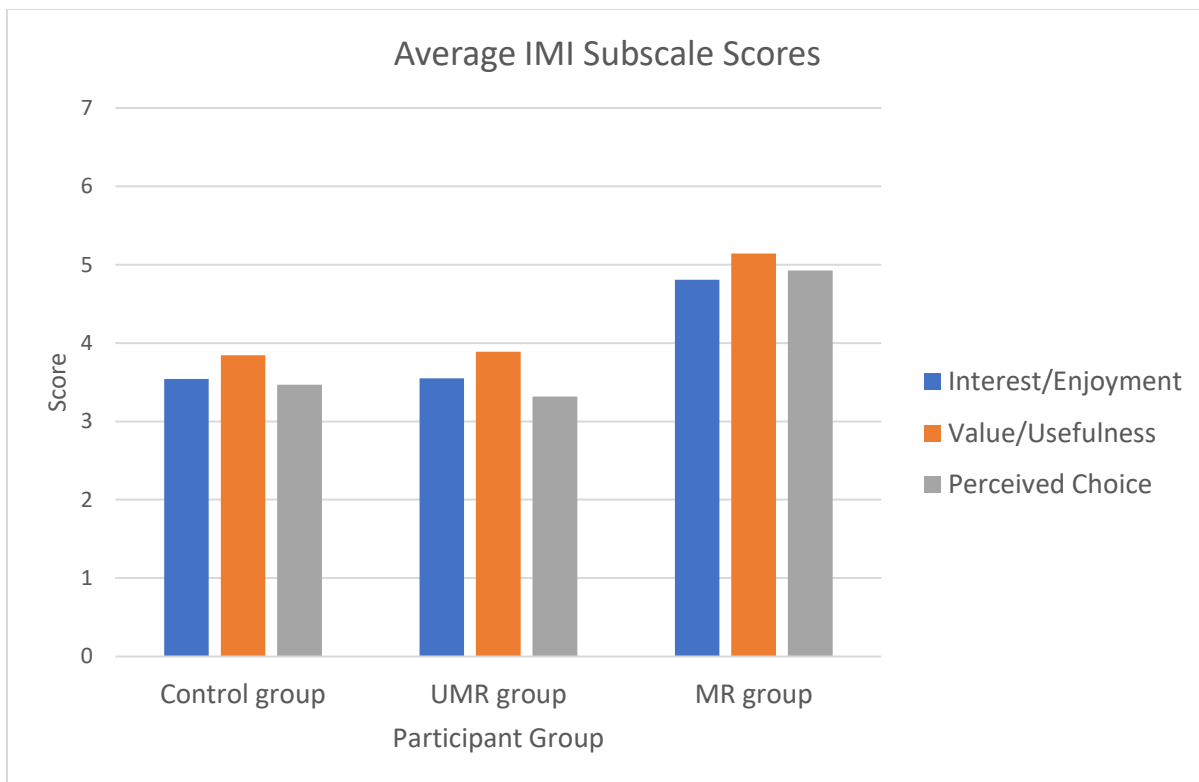


Figure 3. IMI Average Subscale Scores

The MR group scored higher for all 3 subscales compared to other groups. A t-test is performed to confirm the significance of the mean differences.

Figure 4. IMI Subscale Scores Mean Difference t-test

| Subscale | Group | Mean | Std. Deviation | Mean Difference with MR group |
|--------------------|---------|---------|----------------|-------------------------------|
| Interest/enjoyment | Control | 3.54167 | 1.474233 | 1.266667* |
| | UMR | 3.55000 | 1.549626 | 1.258333* |
| | MR | 4.80833 | 1.015358 | - |
| Value/usefulness | Control | 3.84440 | 1.211860 | 1.296333** |
| | UMR | 3.88893 | 1.258440 | 1.251800** |
| | MR | 5.14073 | 0.939543 | - |
| Perceived choice | Control | 3.46667 | 1.364789 | 1.458333** |
| | UMR | 3.31667 | 1.163878 | 1.608333** |
| | MR | 4.92500 | 0.869626 | - |

*t-test is significant at the 0.05 level (2-tailed)

**t-test is significant at the 0.01 level (2-tailed)

Improvements were observed in their mean scores, backed by significance from t-tests. This shows that Motivational Reminders in their intended targeted approach can be effective tools to stimulate autonomy, help players gain more appreciation towards health games' values like usefulness and fun, and thus encouraging self-determined behaviour in adhering to their health game schedule. In the UMR group, this effect is significantly diminished with absence of targeted messages that match participants' exhibited internalization stage.

C. BREQ-2 for Measuring Internalization

The 5 subscales in BREQ-2 correspond to the stages in the internalization process of playing health games, whose scores are denoted by AMOT, EXT, IJ, ID, IM. A decrease in subscales describing earlier internalization stages (AMOT, EXT, IJ) and increase in subscales describing later internalization stages (ID, IM) indicate the occurrence of internalization. To quantify this shift in subscale scores, the Relative Autonomy Index (RAI) of each individual is computed. RAI is obtained through the equation specified in [14], Table 1 method C:

$$RAI_{BREQ-2} = \sum ((AMOT \times -3) + (EXT \times -2) + (IJ \times -1) + (ID \times 1) + (IM \times 3))$$

Equation 1. Relative Autonomy Index (RAI)

Each participant's RAI was computed twice: from the BREQ-2 responses before the study, and the BREQ-2 responses after the study. The improvement in RAI (denoted by ΔRAI) indicates the shift of participants' self-determination. A positive ΔRAI shows improvement while a negative ΔRAI shows a decrease in self-determination. A t-test was performed on mean values of ΔRAI , and the significance of their differences was presented in Table 4.

Table 4. Relative Autonomy Index Improvement (ΔRAI) Mean Difference t-test

| Metric | Group | Mean | Std. Deviation | Mean Difference with MR group |
|--------------|---------|----------|----------------|-------------------------------|
| ΔRAI | Control | 2.89987 | 8.435077 | 13.183267** |
| | UMR | 1.24993 | 9.540251 | 14.833200** |
| | MR | 16.08313 | 9.006617 | - |

**t-test is significant at the 0.01 level (2-tailed)

The control group recorded an average increase of RAI by 2.89987 at the end of experiment, while the MR group recorded 16.08313 improvement RAI value. Thus, it is observed that there is significant occurrence of internalization (i.e. improved self-determination) when they use Motivational Reminders. The UMR group, interestingly, recorded the worst RAI improvement at 1.25, suggesting that the random message styles did not induce much internalization within participants.

The difference in ΔRAI can be attributed to how each BREQ-2 subscale rises or falls after the 7-day period of receiving motivational reminders. Figure 5 summarizes how much each subscale score has changed for the 3 groups. The values are obtained by subtracting post-study BREQ scores from pre-study BREQ scores.

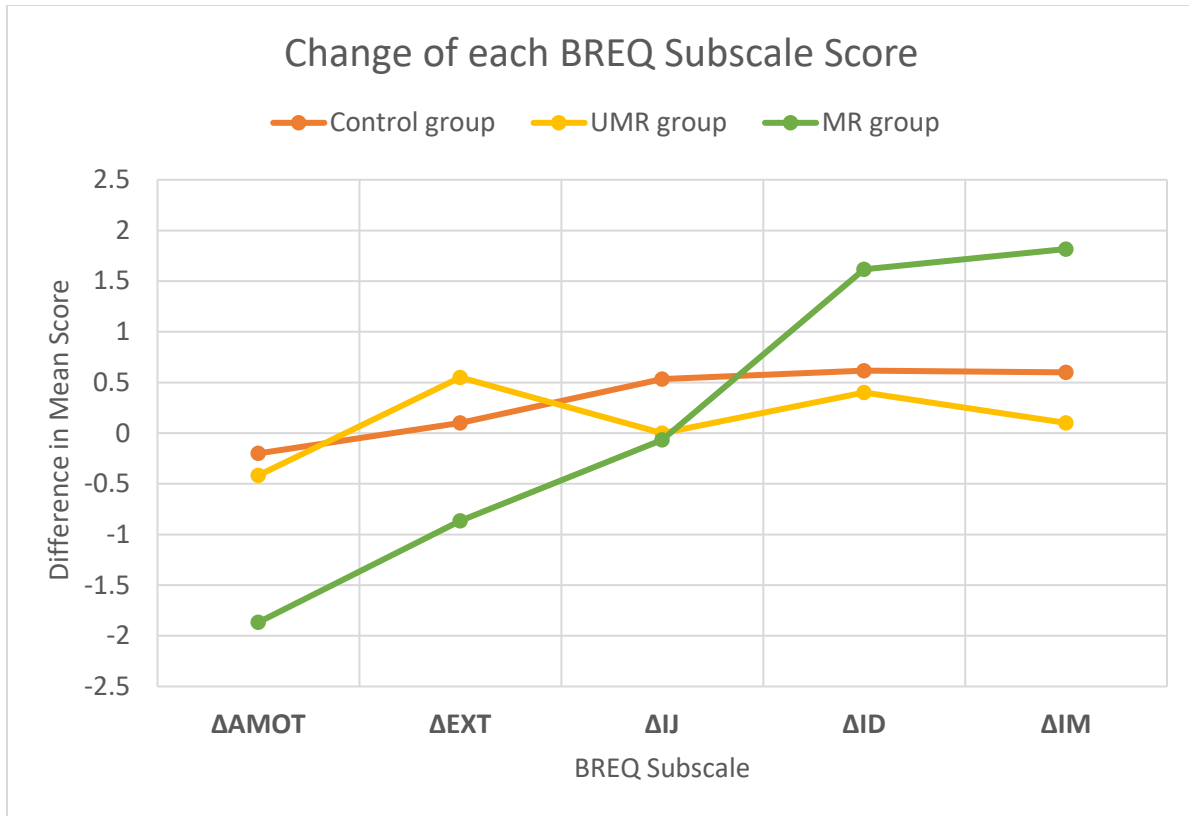


Figure 5. Examining the Change of each BREQ Subscales

Analysis from figure above reveals the trend of more prominently reduced AMOT / EXT subscale scores, and more prominently increased ID / IM subscale scores for the MR group. This same trend is not as pronounced in the 2 other groups. Thus, the use of Motivational Reminders is more effective in reducing the controlling type of motivation and increasing the more autonomous type of motivation, thus exemplifying the occurrence of internalization. The higher Δ RAI among the MR group shown in Table 4 above can be attributed to this trend.

All in all, quantitative methods like t-tests of mean differences were used to compare general reminders and Untargeted Motivational Reminders with Motivational Reminders. Motivational Reminders are shown to improve adherence to new behaviour, enhance intrinsic motivation and facilitate the internalization process of the said new behaviour. It remains a promising approach to

improve health gameplay rate among people who stand to benefit the most from a regular gameplay schedule.

IV. Conclusion

In conclusion, the proposed motivational reminder model was found to improve adherence to playing short segments of health games, and its effects may well extend into tackling other more impactful healthy habits such as medication adherence. Further studies are required to formalize a mechanism to alternate between different reminder styles for prolonged use, as individuals' stage of internalization is likely to change over time. A larger and more diverse study population will also add value to Motivational Reminder's applicability among other age groups or health groups. Persistence of the adherence induced by Motivational Reminders should also be evaluated in future longitudinal studies.

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Appendix A: Modified BREQ-2 used for Study

| | Original BREQ-2 Activity: Exercise External: Pressure from friends/family | Modified BREQ-2 Activity: Play Health Games External Regulation: Hand Sanitizers (in midst of COVID-19 pandemic) |
|-------------|--|--|
| AMOT | <ul style="list-style-type: none"> • I don't see why I should have to exercise • I can't see why I should bother exercising • I don't see the point in exercising • I think that exercising is a waste of time | <ul style="list-style-type: none"> • I don't see why I should play health games • I can't see why I should bother playing health games • I don't see the point in playing health games • I think playing health games is a waste of time |
| EXT | <ul style="list-style-type: none"> • I take part in exercise because my friends/family/spouse say I should • I exercise because others will not be pleased with me if I don't • I feel under pressure from my friends/family to exercise | <ul style="list-style-type: none"> • I play health games because I can get rewarded • I play health games because I won't get rewarded if I don't play • I feel under pressure to play health games |
| IJ | <ul style="list-style-type: none"> • I feel guilty when I don't exercise • I feel ashamed when I miss an exercise session • I feel like a failure when I haven't exercised in a while | <ul style="list-style-type: none"> • I feel guilty when I don't play health games • I feel ashamed when I miss a health game reminder • I feel like a failure when I miss multiple health game reminders |
| ID | <ul style="list-style-type: none"> • I value the benefits of exercise • It's important to me to exercise regularly • I think it is important to make the effort to exercise regularly • I get restless if I don't exercise regularly | <ul style="list-style-type: none"> • I value the benefits of playing health games • It's important for me to play health games regularly • I think it is important to make effort to play health games regularly • I get restless if I don't play health games regularly |
| IM | <ul style="list-style-type: none"> • I exercise because it's fun • I enjoy my exercise sessions • I find exercise a pleasurable activity • I get pleasure and satisfaction from participating in exercise | <ul style="list-style-type: none"> • I play health games because it's fun • I enjoy my gameplay sessions • I find playing health games a pleasurable activity • I get pleasure and satisfaction from playing health games |

The modified BREQ-2 is shuffled and printed on paper for participants to fill in, once before the study and once after the study.

Appendix B: Modified Intrinsic Motivation Inventory (IMI)

| | | Not at all true | | Somewhat true | | | Very true | |
|--|---|-----------------|---|---------------|---|---|-----------|---|
| Activity Perception Questionnaire Items* | | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 1 | I believe that playing this health game could be of some value for me | | | | | | | |
| 2 | I believe I had some choice about playing this health game | | | | | | | |
| 3 | While I was playing this health game, I was thinking about how much I enjoyed it | | | | | | | |
| 4 | I believe that playing this health game is useful for improved concentration | | | | | | | |
| 5 | This health game was fun to play | | | | | | | |
| 6 | I think this health game is important for improving my health | | | | | | | |
| 7 | I enjoyed playing this health game very much | | | | | | | |
| 8 | I really did not have a choice about playing this health game | | | | | | | |
| 9 | I played this health game because I wanted to | | | | | | | |
| 10 | I think this is an important health game | | | | | | | |
| 11 | I felt like I was enjoying the health game while I was playing it | | | | | | | |
| 12 | I thought this was a very boring health game | | | | | | | |
| 13 | It is possible that this game could improve my health | | | | | | | |
| 14 | I felt like I had no choice but to play this health game | | | | | | | |
| 15 | I thought this was a very interesting health game | | | | | | | |
| 16 | I am willing to play this health game again because I think it is somewhat useful | | | | | | | |
| 17 | I would describe this health game as very enjoyable | | | | | | | |
| 18 | I felt like I had to play this health game | | | | | | | |

| | | | | | | | | |
|----|--|--|--|--|--|--|--|--|
| 19 | I believe playing this health game could be somewhat beneficial for me | | | | | | | |
| 20 | I did this health game because I had to | | | | | | | |
| 21 | I believe playing this health game could help me do better in health | | | | | | | |
| 22 | While playing this health game I felt like I had a choice | | | | | | | |
| 23 | I would describe this health game as very fun | | | | | | | |
| 24 | I felt like it was not my own choice to play this health game | | | | | | | |
| 25 | I would be willing to play this health game again because it has some value for me | | | | | | | |

*Interest/enjoyment: 3, 5, 7, 11, 12(R), 15, 17, 23

Value/usefulness: 1, 4, 6, 10, 13, 16, 19, 21, 25

Perceived choice: 2, 8(R), 9, 14(R), 18(R), 20(R), 22, 24(R)³

³ Scoring information: The (R) after an item number is just a reminder that the item score is the reverse of the participant's response on that item.