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Article

Content Validation and Perceived Value of Text Messages to Promote Physical Activity Among U.S. Older Adults and Care Partners

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Highlights

Public health relevance—How does this work relate to a public health issue?

- Physical inactivity among older adults is linked to functional decline, falls, and chronic disease.
- This study addresses the need for scalable, low-cost strategies to promote physical activity in aging populations and their care partners.

Public health significance—Why is this work of significance to public health?

- By validating motivational text messages, this work establishes evidence-based tools that can be integrated into digital interventions to increase activity levels in older adults.
- The finding that messages are equally motivating for both older adults and care partners highlights the potential for dyadic approaches to improving health behaviors.

Public health implications—What are the key implications or messages for practitioners, policy makers and/or researchers in public health?

- Practitioners and health systems can incorporate these validated messages into remote monitoring platforms or fall-prevention programs to support routine physical activity.
- Policymakers and researchers can use this foundation to develop and test scalable, technology-enabled interventions that address physical inactivity among older adults.

Abstract

Background: Motivational text messages can encourage increased physical activity. This study aimed to assess the content validity and perceived motivational value of text messages to encourage physical activity among older adults and care partners. **Methods:** We designed nine motivational text messages to capture nine distinct physical activity scenarios. Using a cross-sectional design, we enrolled 14 content experts, 310 older adults, and 305 care partners. Content experts assessed the relevance, while the older adults and care partners assessed the perceived motivational value of each text message on a 5-point Likert scale. We computed the item content validity index and assessed differences in perceived motivational value among older adults and care partners using quantile regression, while adjusting for sociodemographic and health characteristics. **Results:** The item content validity index ranged from 0.86 to 1.00. The median (interquartile range) perceived motivational values for each text message were 4.0 (3.0–5.0), and there were no statistically significant

differences in the reported motivational values between older adults and care partners. **Conclusion:** We present nine content-validated text messages with high motivational value for older adults and care partners, which can be integrated into technology-based intervention studies and may improve physical activity behavior among both groups.

Keywords: motivational text messages; physical activity; item validation; older adults; care partners

1. Introduction

Physical inactivity among older adults is a major risk factor for frailty, functional decline, disability, and poor health outcomes [1–4]. As older adults age, reductions in strength, balance, and endurance can increase the risk of falls, loss of independence, and hospitalization and institutionalization [5–7]. Regular physical activity can mitigate these declines, improve mood, and enhance overall well-being. Interventions that combine aerobic, strength, and balance training produce the largest gains in independence and quality of life [8–10]. However, participation in recommended activity levels remains suboptimal among community-dwelling older adults, with many reporting only intermittent engagement due to barriers such as pain, fatigue, limited access to programs, and competing health priorities [11–13].

Technology-based interventions, including digital text messaging, offer scalable approaches to promote physical activity in aging populations [13,14]. These tools can provide real-time feedback in support of personal goals, and social reinforcement, which are critical for sustaining motivation [15,16]. Among these technologies, automated text messages are a promising, low-cost strategy for delivering tailored encouragement and promoting self-management behaviors [17,18]. In the context of physical activity, motivational text messages can reinforce positive habits, promote self-efficacy, and foster accountability [19–22]. However, despite increasing use [19,23], there is a paucity of evidence regarding how older adults and care partners interpret and respond to motivational text messages.

Using Self-Determination theory [24], we formulated motivational text messages to promote physical activity among older adults and care partners as part of the Activity Tracking, Care Partner Co-Participation, Text Reminders, Instructional Education, Virtual Physical Therapy, and Exercise (ACTIVE) trial. In this study we assess the content validity of motivational text messages, one component of the ACTIVE intervention, and evaluate differences in perceived motivation among care recipients and care partners. Understanding these differences will inform the design and refinement of contextually appropriate motivational text messages, for use in the ACTIVE trial and other digitally informed interventions, with the goal of improving engagement and the effectiveness of interventions that increase physical activity among older adults and their care partners.

2. Materials and Methods

2.1. Study Population

For this cross-sectional study, we recruited three groups of participants: (1) instrument experts, (2) adults aged ≥ 65 years, and (3) adults aged 18 years and older who self-identified as care partners to an older adult. Participants were identified through ResearchMatch, a national, NIH-funded volunteer registry that connects researchers with individuals interested in participating in health-related studies [25]. ResearchMatch includes more than 120,000 volunteers, including over 13,000 adults aged 65 years and older [25]. A recruitment message was disseminated via the ResearchMatch email listserv, and interested individuals provided their contact information. Those who expressed interest received a link to the study survey. Participants first completed an eligibility screening survey and, if eligible, provided informed consent before accessing the full study questionnaire. All responses to the eligibility survey, consent and survey were collected via Research Electronic Data Capture (REDCap) [26].

2.2. Eligibility Criteria

Individuals were deemed qualified to serve as instrument experts if they met all of the following criteria: (1) at least three years of research expertise in public health, health services, aging, physical activity, rehabilitation, or caregiving research; (2) ability to provide feedback in English; and (3) 18 years or older. Experts were excluded if they were unable to evaluate the clarity and relevance of each text message.

Older adults were eligible to participate if they were community-dwelling, aged 65 years or older, able to read and understand English, had internet access, and were willing to complete the survey. Older adult participants were excluded if they self-reported cognitive impairment that would preclude informed participation, had significant uncorrected visual that would prevent comprehension of survey items, or were currently enrolled in another structured physical activity research study.

Care partners were eligible if they were 18 years or older, identified as an informal caregiver (e.g., family member or friend) who provides any amount of regular unpaid weekly support to an older adult aged ≥ 65 years, could read and understand English, had internet access, and were willing to complete the survey instruments. We excluded care partners who were paid or professional caregivers (e.g., home health aides or nurses), who reported cognitive or communication limitations that would interfere with completing the survey, or who participated in another dyadic research study involving physical activity interventions.

2.3. Message Development

We developed motivational text messages through a structured, theory-informed, multi-step process. First, we identified nine activity scenarios that could occur during daily step monitoring among older adults. These scenarios reflected typical patterns observed in wearable activity data and included: (1) exceeding the daily activity goal, (2) meeting the daily target, (3) slightly below target, (4) low activity, (5) no activity data received, (6) activity improvement from the previous day, (7) activity decrease from the previous day, (8) three or more consecutive days of high activity, and (9) three or more consecutive days of low activity.

Next, we used Self-Determination Theory (SDT) as the guiding behavioral framework for message design [27]. The SDT is built on the principle that sustained motivation arises when three core psychological needs are supported: 1) autonomy – a sense of choice and control, competence – 2) competence – feeling capable of making progress, and relatedness – 3) relatedness – feeling supported and connected [28,29]. Similar to prior studies that used the SDT in the design of text messages [30–32], we applied SDT principles to each scenario to ensure that messages were non-judgmental, supportive, and reinforcing of self-efficacy.

Specifically, we ensured that each motivational text message has one or more of the three core tenets of the SDT principle. Autonomy-supportive language offered choice and avoided pressure (e.g., “Try to take a short walk today or move around the house when you can,” “A little movement today can help boost your mood,” and “Would you like to set a small goal for today?”). Competence was reinforced through statements that highlighted progress and ability (e.g., “Great job yesterday! You were extra active,” “Well done meeting your activity goal,” and “You were so close... just a few more steps next time.”). Relatedness was conveyed through warm, supportive language that emphasized partnership (e.g., “Your body and mind thank you,” “Remember to wear your watch today so we can cheer you on,” and “Your commitment is inspiring.”).

Using this approach, we created nine motivational text messages (Table 1), each tailored to its corresponding scenario. Messages were written to acknowledge day-to-day variability in activity, encourage consistent movement, normalize low-activity days, and reinforce positive behavioral patterns. The final messages were concise (≤ 160 characters), positively framed, and suitable for automated delivery based on daily activity data.

2.4. Data Analysis

We extracted sociodemographic and health characteristics of all study participants, including age, sex, race/ethnicity, educational attainment, marital status, and self-rated health, as potential confounders, consistent with prior literature. We report frequency distributions and summary statistics among instrument experts, older adults, and care partners.

2.5. Content Analysis

We performed a content analysis of each motivational text message by computing the item content validity indices (I-CVI) and Cohen's Kappa, similar to prior studies [33,34]. We used the I-CVI to assess the relevance and clarity of each motivational text message for the situation in which to use. Each of the instrument experts assessed the relevance of the items in the scale on a four-point ordinal scale (1-irrelevant, 2-unable to assess relevance without revision, 3-relevant but needs minor alteration, 4- relevant). Also, the instrument experts assessed the clarity of each motivational text message on a four-point ordinal scale (1- not clear, 2- somewhat clear but needs major revision, 3- mostly clear but needs minor alteration, 4- extremely clear). We recoded the relevance and clarity scales into binary variables – relevant (scores 3 and 4) or not relevant (scores 1 and 2), and clear (scores 3 and 4) or not clear (scores 1 and 2). I-CVI is the proportion of relevant agreement on each item, and it was computed as the number of relevant or clear responses divided by the number of experts [35]. Cohen's kappa provided inter-rater agreement. With p_o representing the observed proportion of agreement, Cohen's kappa was determined using the formula $(p_o - 0.5) / (1 - 0.5)$ [36]. We retained an item if the I-CVI is 0.7 or higher (high validity index) and the Cohen's kappa is 0.6 or higher (good to excellent expert agreement) [35].

2.6. Perceived Motivation

Perceived motivational value for each text message was assessed using a 5-point Likert scale ranging from 1 (not at all motivating) to 5 (extremely motivating), with higher scores indicating stronger perceived motivational value. Enrolled older adults and care partners completed the survey and provided ratings for each message. For every text message, we calculated the median and interquartile range (IQR) of the perceived motivational value scores. To compare perceived motivational value scores between older adults and care partners, we used the Mann-Whitney U test, given the non-parametric distribution of the scores with significance set at $p < 0.05$. Also, we conducted quantile regression to evaluate whether differences in motivational scores persisted after adjusting for sociodemographic and health characteristics, including age, sex, race/ethnicity, educational attainment, marital status, and self-rated health. All analyses were conducted in STATA version 16 [37].

2.7. Human Subjects Research

This study was reviewed and approved by the NYU Langone Health Institutional Review Board (IRB#: i25-00450, 08/21/2025). All participants received and signed electronic informed consent before accessing the survey instruments. All study procedures complied with ethical standards for human subject research and the principles outlined in the Declaration of Helsinki.

3. Results

3.1. Participant Characteristics

Fourteen content experts participated in the study (Mean [SD] age = 30.4 [5.2] years). Eight experts (57%) were male, three (21%) were non-Hispanic White (21%), 10 (71%) were non-Hispanic Black, and one (7%) was Hispanic. The experts represented diverse professional backgrounds, including seven physicians (54%), two nurses (14%), three health service researchers (23%), and two public health researchers (14%). Their research experience ranged from four to 11 years.

A total of 310 older adults, with a mean (standard deviation (SD)) age of 70.1 (4.3) years, enrolled in the study (Table 2). The older adults were predominantly female (57%), non-Hispanic White (51%), married (69%), with excellent self-rated health status (68%). Similarly, we enrolled 305 care partners with a mean (SD) age of 35.3 (10.1) years. The care partners were predominantly female (53%), non-Hispanic White (35%), married (78%), with excellent self-rated health status (77%).

3.2. Expert Validation

Regarding relevance, all nine motivational messages demonstrated excellent content validity (Table 3). Item-level CVIs ranged from 0.86 to 1.00, with corresponding kappa values from 0.72 to 1.00, supporting retention of all messages. Regarding clarity, the nine motivational messages had excellent content validity, with item-level CVIs ranging from 0.93 to 1.00 (kappa values from 0.86 to 1.00).

3.3. Perceived Motivation

Among older adults, all nine messages had a median rating of 4, indicating they are very motivating. Similarly, among care partners, all nine messages had a median rating of 4. Bivariate analysis comparing older adult and care partner scores showed no significant differences in the median scores except for three messages: M5 ($p = 0.005$) – “Looks like we missed your activity data yesterday. No worries – remember to wear your watch today so we can cheer you on!”, M7 ($p = 0.026$) – “Yesterday was a little slower than the day before – and that’s okay. A little movement today can help boost your mood and health”, and M9 ($p = 0.010$) – “We noticed it’s been quiet few days. Would you like to set a small goal for today? A 5-minute stretch or short stroll counts!” However, there were no significant differences in perceptions between older adults and care partners in the univariate model and after adjusting for age, sex, race/ethnicity, educational attainment, marital status, and self-rated health.

Table 1. List of motivational text messages.

Item ID	Condition (when to use)	Message
M1	Excellent day (Exceeded step/activity goal (e.g., 6000+ steps))	“Great job yesterday! You were extra active – your body and mind thank you. Keep that energy going today!”
M2	Met daily target (Achieved target (e.g., 5000 steps))	“Well done meeting your activity goal yesterday! Every step makes a difference for your health. Let’s keep it up!”
M3	Slightly below target (~4000–4999 steps)	“You were so close to your activity goal yesterday – just a few more steps next time. You’ve got this!”
M4	Low activity (Less than 4000 steps)	“We all have slower days sometimes. Try to take a short walk today or move around the house when you can. Every bit counts.”
M5	No activity data (No data received)	“Looks like we missed your activity data yesterday. No worries – remember to wear your watch today so we can cheer you on!”
M6	Activity improved from previous day (Positive change)	“Great news – you moved more yesterday than the day before! Small changes add up. Keep that momentum going!”
M7	Activity decreased from previous day (Negative change)	“Yesterday was a little slower than the day before – and that’s okay. A little movement today can help boost your mood and health.”
M8	Consistently active over 3+ days (active more the 3 days)	“You’ve been on a roll! Three active days in a row – fantastic! Your commitment is inspiring.”
M9	Consistently inactive over 3+ days (inactive more than 3 days)	“We noticed it’s been quiet for a few days. Would you like to set a small goal for today? A 5-minute stretch or short stroll counts!”

Table 2. Sociodemographic Characteristics of older adults and care partners.

Variables	Older Adults (n=310)	Care Partners (n=305)
Mean (SD) Age	70.1 (4.3)	35.3 (10.1)
Sex		
Male	133 (42.9)	144 (47.2)
Female	177 (57.1)	161 (52.8)
Race/Ethnicity		
Non-Hispanic White	157 (50.7)	107 (35.1)
Non-Hispanic Black	98 (31.6)	90 (29.5)
Hispanic	35 (11.3)	92 (30.2)
Other Races	20 (6.5)	16 (5.3)
Educational Attainment		
High School or less	257 (82.9)	241 (79.0)
Some College	47 (15.2)	46 (15.1)
Bachelor's or higher	6 (1.9)	18 (5.9)
Marital Status		
Married	214 (69.0)	239 (78.4)
WDS	82 (26.5)	31 (10.2)
Never Married	14 (4.5)	35 (11.5)
Self-rated Health		
Excellent	211 (68.1)	234 (76.7)
Very good/Good	74 (23.9)	55 (18.0)
Fair/Poor	25 (8.1)	16 (5.3)

* WDS: Widowed, Divorced, Separated,.

Table 3. Content validity assessment of nine motivational text messages for relevance and clarity among instrument experts (n = 14).

Items	E1	E2	E3	E4	E5	E6	E7	E8	E9	E10	E11	E12	E13	E14	No in Agreement	I-CVI	Kappa	Decision
Relevance to Motivation																		
M1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	13	0.93	0.86	Retain
M2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	14	1	1	Retain
M3	1	1	1	1	1	1	1	1	1	1	1	1	1	1	14	1	1	Retain
M4	1	1	1	1	1	1	1	1	1	1	1	1	1	1	14	1	1	Retain
M5	1	1	0	1	1	1	1	0	1	1	1	1	1	1	12	0.86	0.72	Retain
M6	1	1	1	1	1	1	1	1	1	1	1	1	1	1	14	1	1	Retain
M7	1	1	1	1	1	1	1	0	1	1	1	1	1	1	13	0.93	0.86	Retain
M8	1	1	1	1	1	1	1	1	1	1	1	1	1	1	14	1	1	Retain
M9	1	1	0	1	1	1	1	0	1	1	1	1	1	1	12	0.86	0.72	Retain
Clarity of Text Messages																		
M1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	13	0.93	0.86	Retain
M2	1	1	0	1	1	1	1	1	1	1	1	1	1	1	13	0.93	0.86	Retain
M3	1	1	1	1	1	1	1	1	1	1	1	1	1	1	14	1	1	Retain
M4	1	1	1	1	1	1	1	1	1	1	1	1	1	1	14	1	1	Retain
M5	1	1	1	1	1	1	1	0	1	1	1	1	1	1	13	0.93	0.86	Retain
M6	1	1	1	1	1	1	1	1	1	1	1	1	1	1	14	1	1	Retain
M7	1	1	1	1	1	1	1	0	1	1	1	1	1	1	13	0.93	0.86	Retain
M8	1	1	1	1	1	1	1	1	1	1	1	1	1	1	14	1	1	Retain
M9	1	1	1	1	1	1	1	0	1	1	1	1	1	1	13	0.93	0.86	Retain

E: Experts; M: Motivational Texts.

Table 4. Difference in the perceived motivational value of each text message among older adults and care partners.

Item ID	All Population (N=615)	Older Adult (n=310)	Care Partner (n=305)	p-value*	Unadjusted Median Difference (95% CI)	Adjusted Median Difference (95% CI)
	Median (IQR)	Median (IQR)	Median (IQR)			
M1	4.0 (3.0 – 5.0)	4.0 (3.0 – 5.0)	4.0 (3.0 – 5.0)	0.823	0.0 (-0.17, 0.17)	0.0 (-0.24, 0.24)
M2	4.0 (3.0 – 5.0)	4.0 (3.0 – 5.0)	4.0 (3.0 – 5.0)	0.141	0.0 (-0.35, 0.35)	0.0 (-0.62, 0.62)
M3	4.0 (3.0 – 5.0)	4.0 (3.0 – 5.0)	4.0 (3.0 – 5.0)	0.402	0.0 (-0.17, 0.17)	0.0 (-0.49, 0.49)
M4	4.0 (3.0 – 5.0)	4.0 (3.0 – 5.0)	4.0 (3.0 – 5.0)	0.146	0.0 (-0.17, 0.17)	0.0 (-0.40, 0.40)
M5	4.0 (3.0 – 5.0)	4.0 (3.0 – 5.0)	4.0 (3.0 – 5.0)	0.005	0.0 (-0.17, 0.17)	0.0 (-0.73, 0.73)
M6	4.0 (3.0 – 5.0)	4.0 (3.0 – 5.0)	4.0 (3.0 – 5.0)	0.105	0.0 (-0.17, 0.17)	0.0 (-0.28, 0.28)
M7	4.0 (3.0 – 5.0)	4.0 (3.0 – 5.0)	4.0 (3.0 – 5.0)	0.026	0.0 (-0.17, 0.17)	0.0 (-0.45, 0.45)
M8	4.0 (3.0 – 5.0)	4.0 (3.0 – 5.0)	4.0 (3.0 – 5.0)	0.857	0.0 (-0.17, 0.17)	0.0 (-0.24, 0.24)
M9	4.0 (3.0 – 5.0)	4.0 (3.0 – 5.0)	4.0 (3.0 – 5.0)	0.010	0.0 (-0.17, 0.17)	0.0 (-0.51, 0.51)

M: Motivational Text; p-value determined from Mann-Whitney U Test; Median difference assessed using quantile regression. Adjusted model: controlled for age, sex, race/ethnicity, marital status, and self-rated health.

4. Discussion

This study evaluated and validated nine motivational text messages designed to encourage physical activity among older adults and their care partners. Expert assessment supported the content validity of all messages, with high item-level content validity indices indicating that the messages were relevant, clear, and suitable for promoting behavioral motivation. Among end users, both older adults and care partners rated the text messages as very motivational, underscoring their potential to support engagement in physical activity through brief, low-cost digital communication. Together, these findings demonstrate that the messages are acceptable, contextually appropriate, and ready for pilot testing in future behavioral intervention studies.

Although the text messages were rated as highly motivational, the median score of 4 (“very motivating”) suggests that further refinements could enhance their effectiveness. Some participants may prefer more personalized or situationally adaptive messages—for example, incorporating individualized activity goals, progress feedback, or culturally tailored language. For example, instead of a generic message like “Great job yesterday! You were extra active— your body and mind thank you. Keep that energy going today!”, a personalized version might say, “Great job yesterday, Maria—you exceeded your 5,000-step goal even on a rainy day. Your body and mind thank you. Keep that energy going today!” While such tailoring can make messages feel more relevant, supportive, and connected to the person’s lived experience [38,39], it must be limited to participants’ wishes and must be accurate; otherwise, it risks being demotivating and cliched [40,41]. Prior studies suggest that personalized motivational messages are more likely to sustain motivation and promote self-efficacy [38,40].

The absence of significant differences between older adults and care partners in perceived motivational value, based on the adjusted regression model, suggests that the messages resonate across both groups. This alignment may reflect shared goals related to maintaining functional independence. From a behavioral standpoint, care partners often act as both facilitators and co-participants in health-promoting activities [42]. Hence, messages that emphasize encouragement, shared accountability, and mutual reinforcement may appeal to both roles equally. The lack of divergence also supports the generalizability of these messages for interventions targeting older adults and care partner.

While the present study focused on initial perceptions of motivational value, the long-term effects of repeated text messaging warrant careful consideration. Although regular prompts can reinforce habits and sustain engagement, message fatigue or habituation may occur over time, diminishing perceived motivational impact [43]. Prior behavioral research suggests that message effectiveness tends to plateau or diminish with increased frequency due to message fatigue [44,45]. On the other hand, for some users, particularly those with low baseline motivation or limited social support, consistent text messaging may serve as a valuable external cue that reinforces accountability and fosters a sense of connectedness. Future longitudinal studies should therefore examine how message frequency, timing, and personalization interact to influence sustained engagement, physical activity adherence, and user satisfaction over extended periods.

This study has several limitations. First, the cross-sectional design captures perceived motivation at a single point in time, precluding conclusions about long-term engagement or behavioral outcomes. Second, participants were primarily healthy older adults; perceptions may differ among individuals with chronic illness, mobility limitations, or cognitive impairment. Third, reliance on self-reported ratings may introduce social desirability and response bias [46,47], particularly given the study's motivational framing. Fourth, we did not enroll older adult-care partner dyads, and dyadic dynamics may meaningfully shape motivation, decision-making, and perceived support for physical activity in ways that cannot be captured through individual reports. Finally, we did not assess the long-term effects of repeated text messaging, which may influence sustained motivation or lead to habituation. Despite these limitations, the study has notable strengths. The inclusion of a racially diverse expert panel and end-user sample enhances the validity and cultural relevance of the findings. These results provide a solid foundation for subsequent pilot testing and for the development of adaptive, technology-enabled physical activity interventions for older adults and their care partners.

5. Conclusions

We present nine motivational text messages with high content validity and perceived motivational value, designed to promote physical activity among older adults and their care partners. While our findings affirm the messages' acceptability and theoretical soundness, future studies should explore refinements, such as adaptive tailoring, personalization, and variation in delivery, as well as the long-term effects of repeated messaging on sustained motivation and engagement. Overall, these results provide a solid foundation for developing scalable, technology-based interventions that leverage motivational messaging to improve physical activity and health outcomes in older adults and care partners.

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Conflicts of Interest: The authors declare no conflicts of interest.

Abbreviations

The following abbreviations are used in this manuscript:

CI	Confidence Interval
U.S.	United States
WDS	Widowed, Divorced, Separated

References

1. Cunningham C, R OS, Caserotti P, Tully MA. Consequences of physical inactivity in older adults: A systematic review of reviews and meta-analyses. *Scand J Med Sci Sports*. 2020;30(5):816-27.
2. Hamalainen O, Tirkkonen A, Savikangas T, Alén M, Sipilä S, Hautala A. Low physical activity is a risk factor for sarcopenia: a cross-sectional analysis of two exercise trials on community-dwelling older adults. *BMC geriatrics*. 2024;24(1):212.
3. Macera CA, Cavanaugh A, Belletiere J. State of the Art Review: Physical Activity and Older Adults. *American journal of lifestyle medicine*. 2017;11(1):42-57.
4. Hamalainen O, Tirkkonen A, Savikangas T, Alen M, Sipilä S, Hautala A. Low physical activity is a risk factor for sarcopenia: a cross-sectional analysis of two exercise trials on community-dwelling older adults. *BMC geriatrics*. 2024;24(1):212.
5. Hämäläinen O, Tirkkonen A, Savikangas T, Alén M, Sipilä S, Hautala A. Low physical activity is a risk factor for sarcopenia: a cross-sectional analysis of two exercise trials on community-dwelling older adults. *BMC geriatrics*. 2024;24(1):212.
6. van der Velde MGAM, Op Het Veld LPM, van Rossum E, Jansen MAC, Haak HR, Kremers MNT. Risk factors for hospitalisation in community-dwelling pre-frail and frail older people: results of a longitudinal study. *BMC geriatrics*. 2024;24(1):850.
7. Oh A, Patel K, Boscardin WJ, Max W, Stephens C, Ritchie CS, et al. Social Support and Patterns of Institutionalization Among Older Adults: A Longitudinal Study. *J Am Geriatr Soc*. 2019;67(12):2622-7.
8. Langhammer B, Bergland A, Rydwick E. The Importance of Physical Activity Exercise among Older People. *Biomed Res Int*. 2018;2018:7856823.
9. Halvarsson A, Dohrn IM, Stähle A. Taking balance training for older adults one step further: the rationale for and a description of a proven balance training programme. *Clin Rehabil*. 2015;29(5):417-25.
10. Marquez DX, Aguiñaga S, Vásquez PM, Conroy DE, Erickson KI, Hillman C, et al. A systematic review of physical activity and quality of life and well-being. *Translational behavioral medicine*. 2020;10(5):1098-109.
11. Meredith SJ, Cox NJ, Ibrahim K, Higson J, McNiff J, Mitchell S, et al. Factors that influence older adults' participation in physical activity: a systematic review of qualitative studies. *Age Ageing*. 2023;52(8).
12. Chen Y, Shah S, Chen Y, Owen AJ, Ekegren CL, Ilic D, et al. Barriers to and facilitators of physical activity among community-dwelling older adults: a systematic review. *BMJ Open*. 2025;15(8):e095260.
13. Boxall C, Dennison L, Miller S, Joseph J, Morton K, Corser J, et al. Implementing a Digital Physical Activity Intervention for Older Adults: Qualitative Study. *JMIR Aging*. 2025;8:e64953.
14. Di Pumpo M, Miatton A, Riccardi MT, Graps EA, Baldo V, Buja A, et al. Digital Health Interventions to Promote Physical Activity in Community-Dwelling Older Adults: A Systematic Review and Semiquantitative Analysis. *Int J Public Health*. 2024;69:1607720.
15. Papa A, Mital M, Pisano P, Del Giudice M. E-health and wellbeing monitoring using smart healthcare devices: An empirical investigation. *Technological Forecasting and Social Change*. 2020;153:119226.
16. Del-Valle-Soto C, López-Pimentel JC, Vázquez-Castillo J, Nolasco-Flores JA, Velázquez R, Varela-Aldás J, et al. A Comprehensive Review of Behavior Change Techniques in Wearables and IoT: Implications for Health and Well-Being. *Sensors (Basel, Switzerland)*. 2024;24(8).
17. Yakovchenko V, McInnes DK, Petrakis BA, Gillespie C, Lipschitz JM, McCullough MB, et al. Implementing Automated Text Messaging for Patient Self-management in the Veterans Health Administration: Qualitative Study Applying the Nonadoption, Abandonment, Scale-up, Spread, and Sustainability Framework. *JMIR mHealth and uHealth*. 2021;9(11):e31037.

18. Nelson LA, Roddy MK, Bergner EM, Gonzalez J, Gentry C, LeSturgeon LM, et al. Exploring determinants and strategies for implementing self-management support text messaging interventions in safety net clinics. *J Clin Transl Sci.* 2022;6(1):e126.
19. Suffoletto B. Deceptively Simple yet Profoundly Impactful: Text Messaging Interventions to Support Health. *J Med Internet Res.* 2024;26:e58726.
20. Gell NM, Wadsworth DD. The Use of Text Messaging to Promote Physical Activity in Working Women: A Randomized Controlled Trial. *J Phys Act Health.* 2015;12(6):756-63.
21. Bäckman C, Bergkvist L, Wästlund E. Personalized Coaching via Texting for Behavior Change to Understand a Healthy Lifestyle Intervention in a Naturalistic Setting: Mixed Methods Study. *JMIR Form Res.* 2023;7:e47312.
22. Figueroa CA, Deliu N, Chakraborty B, Modiri A, Xu J, Aggarwal J, et al. Daily Motivational Text Messages to Promote Physical Activity in University Students: Results From a Microrandomized Trial. *Annals of behavioral medicine : a publication of the Society of Behavioral Medicine.* 2022;56(2):212-8.
23. Fjeldsoe BS, Marshall AL, Miller YD. Behavior Change Interventions Delivered by Mobile Telephone Short-Message Service. *American Journal of Preventive Medicine.* 2009;36(2):165-73.
24. Manninen M, Dishman R, Hwang Y, Magrum E, Deng Y, Yli-Piipari S. Self-determination theory based instructional interventions and motivational regulations in organized physical activity: A systematic review and multivariate meta-analysis. *Psychology of Sport and Exercise.* 2022;62:102248.
25. ResearchMatch. What is ResearchMatch? 2025 [Available from: <https://www.researchmatch.org/>].
26. Harris P. Research Electronic Data Capture (REDCap). *Journal of the Medical Library Association.* 2018.
27. Ryan RM, Deci EL. Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *Am Psychol.* 2000;55(1):68-78.
28. Legault L. Self-Determination Theory. In: Zeigler-Hill V, Shackelford TK, editors. *Encyclopedia of Personality and Individual Differences.* Cham: Springer International Publishing; 2017. p. 1-9.
29. Patrick H, Williams GC. Self-determination theory: its application to health behavior and complementarity with motivational interviewing. *Int J Behav Nutr Phys Act.* 2012;9:18.
30. Alberts L, Lyngs U, Lukoff K. Designing for Sustained Motivation: A Review of Self-Determination Theory in Behaviour Change Technologies. *Interacting with Computers.* 2024:iwae040.
31. Kinnafick FE, Thøgersen-Ntoumani C, Duda J. The effect of need supportive text messages on motivation and physical activity behaviour. *J Behav Med.* 2016;39(4):574-86.
32. Thompson D, Cantu D, Bhatt R, Baranowski T, Rodgers W, Jago R, et al. Texting to Increase Physical Activity Among Teenagers (TXT Me!): Rationale, Design, and Methods Proposal. *JMIR Res Protoc.* 2014;3(1):e14.
33. Adeyemi O, Bouillon Minois J-B, Siman N, Cuthel A, Goldfeld K, Grudzen C. Knowledge and Attitudes toward Hospice and Palliative Care: Instrument Validation among Emergency Providers. *American Journal of Hospice and Palliative Medicine.* 2022.
34. Adeyemi OJ. Mobile phone use while driving: Development and validation of knowledge, attitude, and practice survey instruments. *Journal of Safety Research.* 2021.
35. Polit DF, Beck CT. The content validity index: are you sure you know what's being reported? Critique and recommendations. *Research in nursing & health.* 2006;29(5):489-97.
36. McHugh ML. Interrater reliability: the kappa statistic. *Biochem Med (Zagreb).* 2012;22(3):276-82.
37. StataCorp. *Stata Statistical Software: Release 16.* College Station, TX: StataCorp LLC; 2017.
38. Tielman ML, Neerinx MA, Brinkman W-P. Design and Evaluation of Personalized Motivational Messages by a Virtual Agent that Assists in Post-Traumatic Stress Disorder Therapy. *J Med Internet Res.* 2019;21(3):e9240.
39. Hawkins RP, Kreuter M, Resnicow K, Fishbein M, Dijkstra A. Understanding tailoring in communicating about health. *Health Educ Res.* 2008;23(3):454-66.
40. Ghantasala RP, Albers N, Penfornis KM, van Vliet MHM, Brinkman WP. Feasibility of generating structured motivational messages for tailored physical activity coaching. *Front Digit Health.* 2023;5:1215187.

41. Wu J, Brunke-Reese D, Lagoa CM, Conroy DE. Assessing the impact of message relevance and frequency on physical activity change: A secondary data analysis from the random AIM trial. *Digit Health*. 2024;10:20552076241255656.
42. Bechara LE, Beaton D, McGilton KS, Tartaglia MC, Black SE. Physical activity perceptions, experiences, and beliefs of older adults with mild cognitive impairment or Alzheimer's disease and their care partners. *Applied Physiology, Nutrition, and Metabolism*. 2020;45(11):1216-24.
43. Fry JP, Neff RA. Periodic prompts and reminders in health promotion and health behavior interventions: systematic review. *J Med Internet Res*. 2009;11(2):e16.
44. Mao B, Jia X, Huang Q. How do information overload and message fatigue reduce information processing in the era of COVID-19? An ability-motivation approach. *Journal of Information Science*. 2022;50(5):1242-54.
45. Keating D, Skurka C. Meta-Analytic Evidence That Message Fatigue is Associated With Unintended Persuasive Outcomes. *Communication Research*. 2024.
46. Althubaiti A. Information bias in health research: definition, pitfalls, and adjustment methods. *J Multidiscip Healthc*. 2016;9:211-7.
47. Van de Mortel TF. Faking it: social desirability response bias in self-report research. *Australian Journal of Advanced Nursing, The*. 2008;25(4):40.

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