Personality Makes a Difference: Attachment Orientation Moderates Theory of Planned Behavior Prediction of Cardiac Medication Adherence

Shira Peleg,[1] Noa Vilchinsky,[2] William A. Fisher,[3] Abed Khaskia,[4] and Morris Mosseri[4]

[1]Tel Aviv University
[2]Bar-Ilan University
[3]Western University
[4]Meir Medical Center

Abstract

Objective: To achieve a comprehensive understanding of patients' adherence to medication following acute coronary syndrome (ACS), we assessed the possible moderating role played by attachment orientation on the effects of attitudes, subjective norms, and perceived behavioral control (PBC), as derived from the Theory of Planned Behavior (TPB; Ajzen, 1991), on intention and reported adherence.

Method: A prospective longitudinal design was employed. During hospitalization, ACS male patients ($N = 106$) completed a set of self-report questionnaires including sociodemographic variables, attachment orientation, and measures of TPB constructs. Six months post-discharge, 90 participants completed a questionnaire measuring adherence to medication.

Results: Attachment orientations moderated some of the predictions of the TPB model. PBC predicted intention and reported adherence, but these associations were found to be significant only among individuals with lower, as opposed to higher, attachment anxiety. The association between attitudes and intention was stronger among individuals with higher, as opposed to lower, attachment anxiety. Only among individuals with higher attachment avoidance, subjective norms were negatively associated with intention to take medication.

Conclusions: Cognitive variables appear to explain both adherence *intention* and *behavior*, but differently, depending on individuals' attachment orientations. Integrating personality and cognitive models may prove effective in understanding patients' health behaviors.

Keywords: Attachment, TPB, medication adherence

In a recent issue of *Journal of Personality*, Markey and Markey (2014) stated that personality is a potent theoretical framework for understanding health-related processes. This statement is consistent with earlier claims that relationship concepts, especially the attachment behavioral system (Bowlby, 1969), should be better integrated into health psychology research (Mikulincer & Shaver, 2007; Shaver & Mikulincer, 2007; Pietromonaco, Uchino, & Dunkel-Schetter, 2013). Inspired by these ideas, we wished to examine whether individuals' attachment orientations would moderate the associations among established social-cognitive predictors (defined by the well-known Theory of Planned Behavior (TPB; Ajzen, 1985, 1991) and health-promoting behavior (medication adherence) among patients coping with a cardiac event.

Cardiovascular diseases (CVD) are the leading cause of death in most industrial countries (Go et al., 2013). Although rates of death attributable to CVD have declined over recent years, the total number of worldwide inpatient cardiovascular operations and procedures increased by 28% from 2000 to 2010 (Go et al., 2014). One of the most effective means of reducing the risk of cardiovascular event recurrence and mortality is via adherence to the recommended medication regimen (Baigent et al., 2009; Mills et al., 2011). Unfortunately, despite patients' acknowledgment of regimen effectiveness (Sud et al., 2005), a considerable

percentage of cardiac patients do not adhere adequately to their medication regimen and therefore fail to receive the full benefits of doing so (see Naderi, Bestwick, & Wald, 2012, for a review of this literature). Thus, in order to advance our understanding of adherence and nonadherence to medication taking in the management of cardiac events, the present study integrated two well-established theories from two different research fields: the theory of planned behavior (Ajzen, 1985, 1991) as representative of the social-cognitive field, and attachment theory (Bowlby, 1969) as representative of the personality and individual differences field.

Theory of Planned Behavior

According to the TPB (Ajzen, 1985, 1991), a well-validated social-cognitive theory of the determinants of intention and behavior (Armitage & Conner, 2001), health-related behavior is a function of one's intention to perform the act in question (i.e., one's behavioral intention [BI]). BI is the direct result of three constructs: (a) attitudes toward the performance of the act (Aact), or the degree to which individuals evaluate personal performance of the behavior in a positive or negative manner; (b) subjective norms (SN), which refer to individuals' perceptions of the social support of or social opposition to their performance of the behavior; and (c) perceived behavioral control (PBC), which refers to individuals' perceptions of their control over personal resources, such as skills, confidence, and the ability to perform the behavior. According to the TPB, these three components predict individuals' behavior via their influence on individuals' behavioral intentions. In addition, PBC, unlike attitudes and subjective norms, may also exert a *direct* effect on behavior. The more positive one's attitudes, subjective norms, and PBC are toward a behavior, the stronger one's intention to implement it. Further, the more positive one's intention and PBC are in regard to implementing a behavior, the more likely the individual is to actually implement it (Ajzen, 1985, 1991).

Despite the widespread use of the TPB and its utility in predicting health behaviors (meta-analyses have concluded that TPB constructs may account for 39–44% of the variance in intentions and 19–27% of the variance in actual behavior; Armitage & Conner, 2001; McEachan, Conner, Taylor, & Lawton 2011), a considerable degree of unexplained variance remains. Several explanations for this unexplained variance have been suggested, among them changes in intention, random measurement errors, and variables other than the theory's predictors that are associated with intention (e.g., past behavior; for a review, see Sutton, 1998). Another body of research suggests that the associations among the TPB constructs are moderated by relevant variables, including personality predispositions (e.g., Harris & Hagger, 2007; Rhodes, Courneya, & Hayduk, 2002; Rhodes, Courneya, & Jones, 2005), attenuating direct linear associations. Indeed, although Fishbein and Ajzen (1975) viewed personal characteristics as distal variables that affect behavior through the TPB model, Ajzen (2011) more recently indicated that given the findings of different studies, it is apparent that the relative weight of each of the theory's predictors is dependent on stable individual differences.

In keeping with this line of thought, and based on the premise that attachment orientation may contribute to an understanding of health-related psychological processes (Pietromonaco et al., 2013), we focused in the current study on attachment orientations (Bowlby, 1969; Mikulincer & Shaver, 2007; Shaver & Mikulincer, 2007) as possible moderators of the associations among TPB constructs and medication adherence. We suggest that subjective norms, attitudes, and PBC differ in their ability to predict individuals' intentions to perform a behavior and the reported behavior itself, for high versus low avoidant-attached and anxiously attached individuals, mainly because such individuals differ both in motivations and in coping mechanisms for dealing with threats.

The Personality Perspective: Attachment Orientation as a Potential Moderator

Attachment theory is a comprehensive model of the influence of relationship-related expectations, which originate in early relationships, on one's strategies for coping with stressful situations (Bowlby, 1969; Mikulincer & Shaver, 2007). According to attachment theory, infants seek closeness with their primary caregivers, especially when they feel threatened (Bowlby, 1969; Mikulincer & Shaver, 2007). Depending in part on the consistency and reliability of the primary caregiver, individuals' inclinations toward different attachment orientations emerge (Mikulincer & Shaver, 2007). While individuals high on the attachment avoidance continuum tend to limit intimacy and maintain psychological and emotional independence from their significant others, individuals high on the attachment anxiety continuum tend to worry that their partner might be unavailable or unsupportive when needed (Mikulincer & Shaver, 2007). Thus, the way in which individuals attach is related to how they regulate their emotions and behaviors in response to threatening events.

According to Bowlby (1969), perceptions and memories of the type or quality of care that individuals received from early attachment figures shape the way they respond to their attachment figures in adulthood. Generally speaking, it is presumably adults romantic partners, and not their primary attachment figures, who serve as their main source of support, and this is especially true for male cardiac patients who, due to the average age of onset of first acute coronary syndrome (ACS; 61 years for Israeli men; ACSIS, 2010), are at a stage in their lives when they rely primarily on their intimate partners (Cutrona, 1996; Shaw, Krause, Liang, & Bennett, 2007).

It has been suggested that the attachment system is strongly activated in a health-related event, mainly due to the fact that illness is a physical threat and that during hospitalization one must cope with a new environment, with trusting strangers, and with separating from significant others, all of which are potential attachment-related stressors (Hunter & Maunder, 2001). Therefore, attachment orientation can be seen as playing an important role in health-related psychological processes (Pietromonaco

et al., 2013; Maunder & Hunter, 2015). Specifically, Hunter and Maunder (2001) suggest that individuals high on anxious attachment have little confidence in their ability to cope with their illness by themselves and use a variety of means to keep their significant others and their medical team regularly engaged. In support of this idea, it was found that individuals high on the anxious attachment orientation utilize health services more frequently than individuals high on the avoidance attachment orientation (Ciechanowski, Walker, Katon, & Russo, 2002), report higher symptom levels, and show high levels of hopelessness (Cicero, Lo Coco, Gullo, & Lo Verso, 2009).

Patients high on avoidant attachment, on the other hand, show a general unwillingness to seek help (Mikulincer & Shaver, 2007). Moreover, because closeness and dependence are sources of stress for these individuals, their interactions with others are characterized by a certain level of mistrust and a perception of others' ineffectiveness (Maunder & Hunter, 2015). In keeping with this view, research has found that individuals high on the attachment avoidant orientation have more problems trusting health care providers than individuals low on this orientation (Maunder & Hunter, 2009).

These findings indicate that highly anxiously attached individuals cope with health threats by means of keeping others engaged, whereas avoidant-attached individuals cope by means of extreme self-reliance. Other studies have relied on these coping strategy differences to point out the regulatory function of attachment orientation as a moderator on the associations between social, cognitive, and emotional variables (Bodie et al., 2010; Vilchinsky, Dekel, Revenson, Liberman, & Mosseri, 2015). Conceptualizing attachment orientations as moderators of the associations between social-cognitive variables and health outcomes makes sense in light of attachment theory's focus on self-regulation (Mikulincer, Shaver, & Pereg, 2003). As originally suggested by Bowlby (1969), the quality of people's early interpersonal childhood experiences shapes their ability to self-regulate over the course of their entire life span.

Accordingly, it was found that providing support after a cardiac event reduced anxiety symptoms 6 months after the event among highly anxiously attached patients (compared to those low on anxious attachment), but did not affect anxiety symptoms among highly avoidant individuals (Vilchinsky et al., 2010). In another study, it was found that patients' illness perceptions predicted emotional outcomes following a cardiac event, but only among highly avoidant individuals compared to individuals low on avoidance attachment (Vilchinsky, Dekel, Asher, Leibowitz, & Mosseri, 2013). These findings led the authors to suggest that avoidant individuals emotion regulation was achieved by relying on their internal resources, in this case their cognitive illness perceptions.

The Current Study: Integrating the TPB and Attachment Theory

The aforementioned findings suggest that the predictive utility of illness perceptions and social feedback on one's outcomes differs as a function of one's attachment orientation. Specifically, highly avoidant individuals' outcomes (compared to outcomes for individuals low on avoidance) tend to be affected more by their own perceptions and less by social feedback, whereas highly anxiously attached individuals (compared to individuals low on anxious attachment) seem, when facing a threat, to be more sensitive and responsive to others' thoughts and opinions.

Since attitudes, subjective norms, and PBC, according to the TPB, form the basis of one's motivation to enact a behavior (i.e., they predict intention directly and actual behavior indirectly, through intention), it was predicted that attachment orientation would moderate the associations between the TPB predictors and intention. In addition, since PBC, according to the TPB, is the only predictor that has both a direct effect and an indirect effect (through intention) on behavior, it was predicted that in this case, attachment orientation would also moderate the PBC's direct effect on adherence.

Since the subjective norms component of the TPB represents individuals' perceptions regarding others' expectations of them, this construct was not predicted to motivate highly avoidant individuals (compared to individuals low on avoidant attachment), as they seem to have little trust in others, see others as ineffective, and are not inclined to process this information. Among anxiously attached individuals, however, we expected to find the opposite scenario. Specifically, given their greater reliance on others and their preoccupation with others' opinions and ideas, we expected that highly anxious individuals would be more motivated by what people around them think, say, or feel. Therefore, it was hypothesized that:

> *H1*: Subjective norms would predict *intention* to adhere to medication recommendations, but this association would be stronger the higher the individual's anxious attachment is, and the lower the individual's avoidant attachment is.

Given that the PBC component of the TPB reflects people's beliefs that they have the skills and internal resources to take care of themselves, this construct was predicted to motivate highly avoidant individuals more than individuals low on avoidant attachment, as highly avoidant individuals are driven by independence and self-reliance, and are guided by their own perceptions and internal resources. Among anxiously attached individuals, however, we expected the opposite. Given their consistent preoccupation with others' opinions of them, and in keeping with findings indicating that their main motivation is to gain validation from others in a threatening event, it was predicted that PBC would be less of a motivator for highly anxiously attached individuals, compared to those low on anxious attachment. That is, even though highly anxiously attached individuals may have high PBC, we predicted that they would still be preoccupied with engaging others in order to cope with the event, and such preoccupation might prevent them from being

motivated by their own internal resources, such as their PBC. Accordingly, it was hypothesized that:

> H2: PBC would predict *intention* to adhere to medication recommendations, but this association would be stronger the higher the individual's avoidant attachment is, and the lower the individual's attachment anxiety is.

In addition, since PBC also exerts a direct effect on behavior (in addition to its indirect effect), it was hypothesized that:

> H3: The association between PBC and *behavior* would be stronger the higher the individual's avoidant attachment is, and the lower his or her attachment anxiety is.

The attitudes component of the TPB represents people's perceptions regarding the quality of the behavior (e.g., good or bad, necessary or unnecessary). This information may be gained either by personal experience and information seeking, which makes it a potential internal resource, or by relying on others' opinions and thoughts, which makes it a potential external resource (i.e., others support the recommended behavior). Thus, with no definite prediction, the moderation effect of attachment on the association between attitudes and intention was examined in an exploratory fashion.

Finally, based on the TPB framework, which suggests that intention mediates the associations among subjective norms, attitudes, PBC, and behavior, it was also hypothesized that:

> H4: *Intention* would mediate the associations between the interaction terms of attachment orientations with attitudes, subjective norms, and PBC and patients' *behavior*.

METHOD

Participants and Procedure

The current study was part of a large-scale longitudinal, prospective research project investigating personal and dyadic adjustment to heart disease (George-Levi et al., 2016). Data were collected between the period of May 2011 and August 2012 from the Cardiac Care Unit (CCU) of Sheba Medical Center, the largest medical center in Israel, and the Meir Medical Center, located in a more peripheral region of Israel. The target population was composed of all married or cohabiting men diagnosed with their first ACS. Patients over 75 years of age, patients with a diagnosis other than ACS (i.e., other than myocardial infarction or unstable angina), patients who had comorbid conditions (e.g., psychiatric illness, neoplasia), and patients who could not be interviewed in Hebrew were excluded. Of the 141 eligible patients, 106 agreed to participate in the current study (75% recruitment rate) and completed the study questionnaires during their hospitalization. Of those, 90 participants were also interviewed 6 months post-discharge (15% attrition rate). As this

study was part of a larger study focusing on dyadic relationships and consisting of male patients and female caregivers, all participants were married or cohabiting men. The average duration of relationships was 27.26 years ($SD = 12.23$). The average age of participants was 55.71 years ($SD = 7.87$), and they had an average of 13.88 years of education ($SD = 3.34$). The majority (87.7%) reported that their economic status was moderate or lower. In addition, illness severity was found to be mild to moderate on average ($M = 2.71$, $SD = 0.89$; $M = 2.01$, $SD = 0.88$, for severity according to catheterization and echocardiogram, respectively, on a range of 1 (normal)–5 (extremely severe).

The study protocol was approved by the Sheba and Meir hospital institutional review boards. All eligible patients were approached, 1 day after catheterization, by a member of the research team and asked to participate in this study. Patients who consented were given the study questionnaires and instructed to complete them independently or with the help of a research assistant if they wished. After 6 months, a research assistant recontacted participants by phone and set up an appointment with them (usually at their homes, but in a few cases, per participant request, at the hospital facility during regular checkups) for the completion of follow-up assessments. Patients who completed all study questionnaires both at hospitalization and at follow-up received a gift certificate in the amount of $55.

Measures

All measures described below were administered to participants during hospitalization (T_1), except for the adherence to medication questionnaire, which was administered 6 months post-discharge (T_2). All measures were administered in Hebrew.

Theory of Planned Behavior. Theory of planned behavior (TPB; Ajzen, 1991) items were developed specifically for the requirements of the current study, in keeping with Ajzen's (1985) guidelines for the development of assessments to explore TPB constructs and relationships. To minimize participant burden, we used the short version for each TPB measure (see also Hagger, Chatzisarantis, Biddle, & Orbell, 2001; Plotnikoff et al., 2011). The specific instruments were as follows.

Attitudes. Attitudes toward fully adhering to medication recommendations were assessed using four 7-point semantic differential scales. Participants were asked to complete this statement: "A full implementation of the medication recommendations which will be given to me upon hospital discharge is" (a) 1 = *silly* to 7 = *wise*, (b) 1 = *bad* to 7 = *good*, (c) 1 = *unnecessary* to 7 = *necessary*, and (d) 1 = *unpleasant* to 7 = *pleasant*. The last item (unpleasant-pleasant) reduced Cronbach's alpha to .48. Therefore, it was omitted, and scores were computed by averaging responses of the three remaining items (Cronbach's $\alpha = .91$).

Subjective Norms. Subjective norms regarding full adherence to medication recommendations were assessed using one

item as suggested by Ajzen and Fishbein (1980): "Most people important to me think I should fully implement the medication recommendations which will be given to me upon hospital discharge." Responses were provided on a Likert scale ranging from 1 (*strongly disagree*) to 7 (*strongly agree*).

Perceived Behavioral Control (PBC). PBC was measured by three items that were developed in accordance with Ajzen's (1985) guidelines: (a) "For me, fully implementing the medication recommendations which will be given to me upon hospital discharge is __." Responses were assessed on a Likert scale ranging from 1 (*hard*) to 7 (*easy*). (b) "If I wanted, I could easily fully implement the medication recommendations which will be given to me upon hospital discharge." Responses were assessed on a Likert scale ranging from 1 (*completely disagree*) to 7 (*completely agree*). (c) "How much control do you have over a full implementation of the medication recommendations which will be given to you upon hospital discharge?" Responses were assessed on a Likert scale ranging from 1 (*poor control*) to 7 (*strong control*). Cronbach's alpha for the three items was .76. Scores were computed by averaging the responses on the three items, with higher scores representing greater PBC.

Intention to Adhere to Medication Recommendations. One item assessed participants' intention to adhere to medication recommendations: "I intend to fully implement the medication recommendations which will be given to me upon hospital discharge." Responses were assessed on a Likert scale ranging from 1 (*definitely won't*) to 7 (*definitely will*).

Adherence to Medication Recommendations. Adherence was measured by the Medication Adherence Report Scale (MARS; Horne & Hankins, 2004). The MARS is a brief self-report questionnaire evaluating nonadherent behaviors. Patients are asked to indicate the frequency with which they engage in each of the following five aspects of nonadherence: forgetting, altering the dosage, stopping medication, missing a dose, and taking less than instructed. Responses are given on a 5-point Likert scale ranging from 1 (*always*) to 5 (*never*). A score for medication adherence is calculated by summing these five items' scores, ranging from 5 to 25, with higher scores representing a higher level of self-reported adherence. This instrument was developed in a way that reduces social desirability effects, and it was found to have a high internal and test–retest reliability (Horne & Hankins, 2004). In the present study, Cronbach's alpha was found to be moderate-high (.71).

Attachment Orientation. Attachment orientations were measured using the Hebrew version of the Experiences in Close Relationships scale (ECR; Brennan, Clark, & Shaver, 1998). The ECR is a self-report scale measuring the dimensions of anxious and avoidant attachment orientations. Participants rated the extent to which each item of the questionnaire was descriptive of their feelings in close relationships on a 7-point scale ranging from 1 (*not at all*) to 7 (*very much*). Eighteen items addressed anxious

attachment orientation (ANX; e.g., "I worry about being abandoned") and 18 addressed avoidant attachment orientation (AVO; e.g., "I prefer not to show my partner how I feel deep down"). Scores were computed for each of the subscales by averaging the responses on the relevant items. Cronbach's alphas were .85 and .84 for anxious and avoidant attachment, respectively.

Sociodemographic Data. Participants were asked to complete a short demographic questionnaire including their age; number of children; years of education; socioeconomic status (SES), which was measured on a scale ranging from 1 (*excellent*) to 5 (*very poor*); and relationship duration (in years).

Illness Severity. The severity of the patient's illness was estimated by two senior cardiologists using two sets of criteria: an echocardiogram score, which evaluated cardiac damage, and an angiogram score (status of obstructed arteries), which evaluated the risk of future damage. Both scores were measured on a scale ranging from 1 (*normal*) to 5 (*extremely severe*).

Statistical Analyses

At T_1, no more than 1% of missing values for each variable was present. At T_2, 15% ($n = 16$) of the sample did not complete the adherence to medications questionnaire. As there were no significant differences in sociodemographic variables and in TPB variables (attitudes, subjective norms, PBC, and intention) at T_1 between dropouts and continuers, and the overall amount of missing data was relatively small, a list-wise deletion of missing cases was applied (Graham, 2009). Calculations of means and standard deviations, bivariate correlations, and regression analyses were performed using SPSS version 20.

According to a preliminary power analysis for the regression analyses, conducted based on Cohen's (1988) procedures, with the alpha set at .05, the power to detect a medium effect size (.15) for the interactions effects above and beyond the main effects is 0.84 for predicting intention and 0.75 for predicting reported adherence. The power to detect a small effect size (.02) is 0.14 for predicting intention and 0.13 for predicting reported adherence.

RESULTS

Characteristics of the Study Sample

Bivariate correlations between sociodemographic variables and the dependent variables (intention and adherence) were nonsignificant. In addition, no significant associations were found between illness severity and intention to adhere ($r = –.06, p = .54; r = –.01, p = .88$ for severity according to catheterization and echocardiogram, respectively) or between illness severity and reported adherence ($r = –.01, p = .90; r = .14, p = .20$ for severity according to catheterization and echocardiogram, respectively).

Table 1 presents the means and standard deviations of the study's variables as well as the bivariate correlations between them. Overall, participants reported high levels of positive

Table 1 Means, Standard Deviations, and Bivariate Correlations of All Variables Tested

		M	SD	Range	1	2	3	4	5	6	7
1.	Attitudes	6.80	0.65	1.67–7	1						
2.	Subjective norms	6.78	0.63	4–7	.12	1					
3.	PBC	5.97	1.36	1–7	.16	.11	1				
4.	Intention	6.64	0.87	2–7	.37***	−.01	.33**	1			
5.	Anxious attachment	2.38	0.98	1–5.39	.12	−.20*	−.19	.12	1		
6.	Avoidant attachment	3.23	0.97	1.39–6.33	.02	−.11	.08	.04	.10	1	
7.	Medication adherence	23.86	2.09	11–25	.08	−.01	.35**	.47***	−.01	.05	1

Note. $N = 106$. PBC = perceived behavioral control.
*$p < .05$. **$p < .01$. ***$p < .001$.

attitudes and subjective norms concerning adherence to medication, high levels of PBC, high levels of intention to adhere to the medication recommendations, and high reported adherence to medication recommendations. In addition, participants reported low-to-moderate anxious and avoidant attachment orientations. As can be seen from Table 1, intention was positively associated with attitudes and PBC, but not with subjective norms. Adherence assessed at the 6-month follow-up was positively associated with both intention and PBC.

Predicting Intention to Adhere to Medication Recommendations

A linear hierarchical regression analysis was conducted in order to assess the direct and interactive contribution of the TPB variables and attachment orientations to intention to adhere to medication. Attitudes, subjective norms, and PBC were entered in Step 1, and attachment orientations—anxious (ANX) and avoidant (AVO)—were entered in Step 2. The six two-way interaction terms between each attachment orientation and each of the TPB variables were entered in Step 3 (consisting of the product

Table 2 Hierarchical Regression Analysis for Predicting Intention by TPB Variables, Attachment Orientation, and the Interactions Between Attachment Orientation and TPB Variables

Variables in the model	Step 1 B	Step 2 B	Step 3 B
Attitudes	0.29***	0.27**	0.76***
Subjective norms	−0.07	−0.05	−0.14
PBC	0.24**	0.27**	0.26**
ANX		0.12	0.04
AVO		−0.01	0.13
Attitude x ANX			0.46**
PBC x ANX			−0.20*
SN x ANX			−0.06
Attitude x AVO			0.14
PBC x AVO			−0.01
SN x AVO			−0.34 $_{p = .05}$

Note. $N = 104$. $R^2 = 0.22$ for the first step ($p < .001$); $\Delta R^2 = 0.02$ for the second step ($p = .35$); $\Delta R^2 = 0.16$ for the third step ($p = .001$). TPB = theory of planned behavior; PBC = perceived behavioral control; ANX = attachment anxiety; AVO = attachment avoidance; SN = subjective norms.
*$p < .05$. **$p < .01$. ***$p < .001$.

of the standardized scores of attachment orientation and each of the TPB variables; e.g., AVO × Attitudes, AVO × PBC).

Table 2 presents the results for each effect at the step in which it was entered into the regression equation. Results indicated that the TPB variables explained 22% of the variance in intention, $F(3, 100) = 9.38$, $p < .001$, with attitudes and PBC emerging as significant predictors. The addition of attachment orientations did not result in a significant change in the explained variance, $F_{change}(2, 98) = 1.07$, $p = .35$. However, the third step, which consisted of the interaction terms, added 16% to the explained variance, $F_{change}(6, 92) = 3.94$, $p = .001$, with three interactions emerging as significant predictors: Attitudes × ANX, SN × AVO, and PBC × ANX.

Simple slopes analyses (Preacher, Curran, & Bauer, 2006) for probing the Attitude x Anxious Attachment interaction indicated that the association between attitudes and intention was significant and positive when the levels of anxious attachment were low (values at one standard deviation below the mean), $B = 0.30$, $SE = 0.08$, $t = 3.59$, $p = .001$, and somewhat stronger when these levels were high (values at one standard deviation above the mean), $B = 1.22$, $SE = 0.29$, $t = 4.12$, $p < .001$ (see Figure 1). Simple slopes analysis for the Subjective Norms x Avoidant Attachment interaction in predicting intention revealed that the association between subjective norms and intention was significant (and negative) when the levels of avoidant attachment were high, $B = 0.49$, $SE = 0.17$, $t = -2.79$, $p = .01$, but not when these levels were low, $B = 0.20$, $SE = 0.21$, $t = 0.92$, $p = .36$ (see Figure 2). Finally, as hypothesized, the association between PBC and intention was significant and positive when the levels of anxious attachment were low, $B = 0.46$, $SE = 0.11$, $t = 4.10$, $p < .001$, but not when these levels were high, $B = 0.05$, $SE = 0.11$, $t = 0.49$, $p = .63$ (see Figure 3).

Predicting Reported Adherence to Medication Recommendations

We examined whether the contribution of the TPB variables to reported adherence was moderated by attachment orientation. Specifically, the same approach in which intentions were predicted was employed, except that here, intention was entered in Step 4 in order to assess changes in the standardized coefficients,
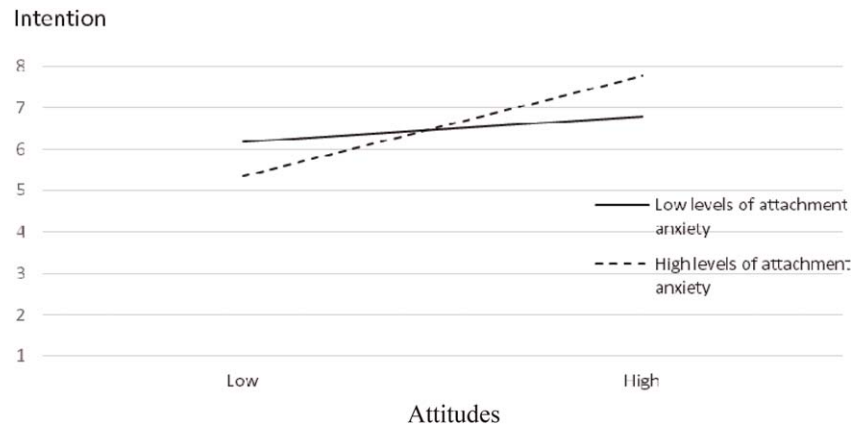
Intention

Figure 1 Attitudes × Attachment Anxiety interaction in predicting intention to adhere to medication recommendations.
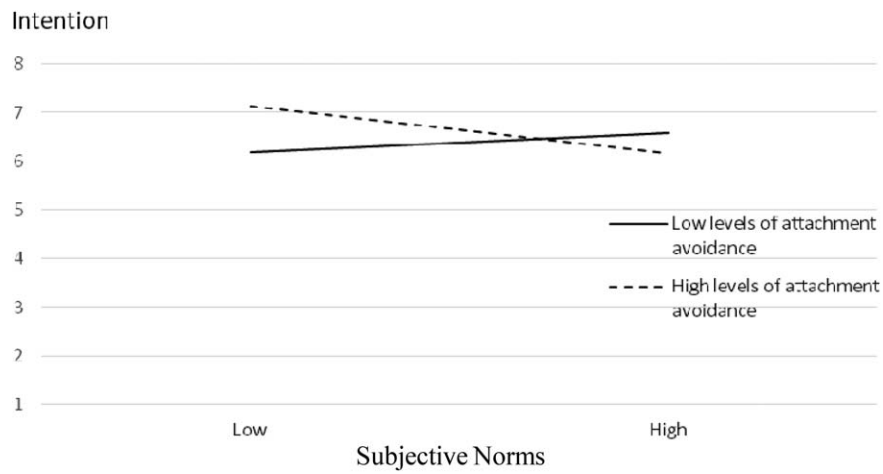
Intention

Figure 2 Subjective Norms × Attachment Avoidance interaction in predicting intention to adhere to medication recommendations.
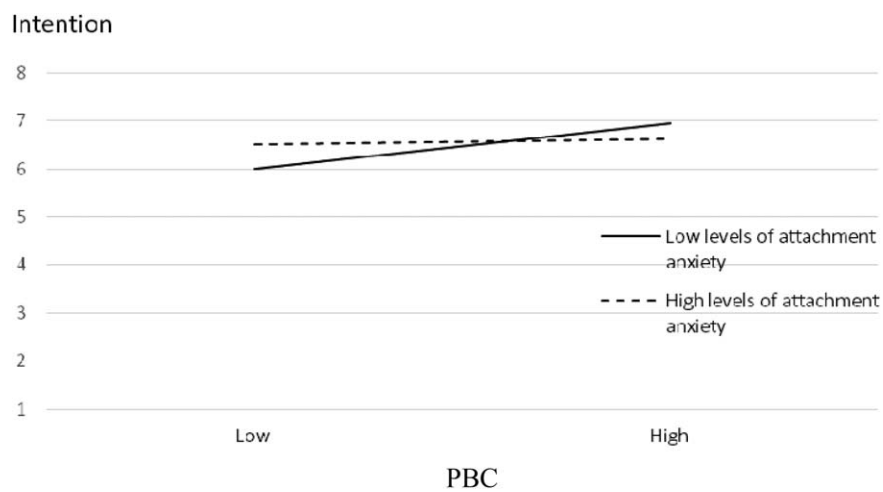
Intention

Figure 3 PBC × Attachment Anxiety interaction in predicting intention to adhere to medication recommendations. PBC = perceived behavioral control.

Table 3 Hierarchical Regression Analysis for Predicting Adherence by TPB Variables, Attachment Orientation, and the Interactions Between Attachment Orientation and TPB Variables

Variables in the model	Step 1 B	Step 2 B	Step 3 B	Step 4 B
Attitudes	0.01	−0.01	0.01	−0.37
Subjective norms	−0.05	−0.03	−0.11	−0.03
PBC	0.36**	0.40**	0.49***	0.32*
ANX		0.10	0.03	−0.07
AVO		0.05	0.14	0.16
Attitude x ANX			0.16	−0.12
PBC x ANX			−0.36**	−0.21
SN x ANX			−0.07	−0.02
Attitude x AVO			−0.10	−0.18
PBC x AVO			0.02	0.08
SN x AVO			−0.05	0.06
Intention				0.45***

Note. $N = 88$. $R^2 = 0.13$ for the first step ($p = .008$); $\Delta R^2 = 0.01$ for the second step ($p = .59$); $\Delta R^2 = 0.11$ for the third step ($p = .08$); $\Delta R^2 = 0.12$ for the fourth step ($p < .001$). TPB = theory of planned behavior; PBC = perceived behavioral control; ANX = attachment anxiety; AVO = attachment avoidance; SN = subjective norms.
*$p < .05$. **$p < .01$. ***$p < .001$.

which may indicate a mediation effect of intention, as the model of TPB predicts.

Results (presented in Table 3) indicated that the first step accounted for 13% of the variance of reported adherence, with only PBC emerging as a significant predictor. Attachment orientations did not result in a significant change in the explained variance of reported adherence, $F_{change}(2, 82) = 0.52$, $p = .59$, when entered in the second step. The third step added a marginal 11% to the explained variance in adherence, $F_{change}(6, 76) = 1.94$, $p = .08$, with only the PBC x ANX interaction as a significant predictor of adherence. A simple slopes analysis indicated that, as hypothesized, whereas the association between PBC and reported adherence was significant when the levels of anxious attachment were low, $B = 1.25$, $SE = 0.45$, $t = 2.77$, $p = .01$, it was not significant when these levels were high, $B = 0.23$, $SE =$

0.35, $t = 0.65$, $p = .52$ (see Figure 4). The inclusion of intention at the fourth step added a significant 12% to the explained variance, $F_{change}(1, 75) = 13.92$, $p < .001$, and caused both the effects of PBC and PBC x ANX to be reduced. This pattern is suggestive of a partial mediation effect. Consistent with this idea, an additional bootstrapping analysis was applied (Hayes, 2012), indicating that the indirect effect of the interaction between PBC and attachment anxiety on adherence, through intention, was significant, $B = -0.15$, $SE = 0.12$, 95% CI [−0.52, −0.001]. Overall, the mediated moderation model accounted for 31% of the variance of adherence, $F(4, 84) = 9.29$, $p < .001$. An illustration of the final model is depicted in Figure 5.

DISCUSSION

In the present study, we followed up on calls for a more integrative examination of health behaviors and motivations, which take into account both people's cognitions as well as their personality characteristics (Markey & Markey, 2014; Pietromonaco et al., 2013). Specifically, we assessed the possible moderating role played by attachment orientations on the effects of attitudes, subjective norms, and perceived behavioral control on intention to adhere to medication recommendations and on the reported adherence behavior itself.

First, as the TPB model suggests, a substantial association was detected between intentions and behavior. PBC was the only component to predict both intentions and behavior (either directly or via the mediation of intentions); the attitudes component predicted only intentions, and subjective norms were found to predict neither intentions nor behavior. The latter null finding is consistent with previous studies showing that the prediction of medication adherence on the basis of subjective norms is either nonexistent or very low (Chisholm, Williamson, Lance, & Mulloy, 2007; Gatt & Sammut, 2008; Quine, Steadman, Thompson, & Rutter, 2012). One explanation for this finding may be that after ACS, patients are generally amenable to taking their
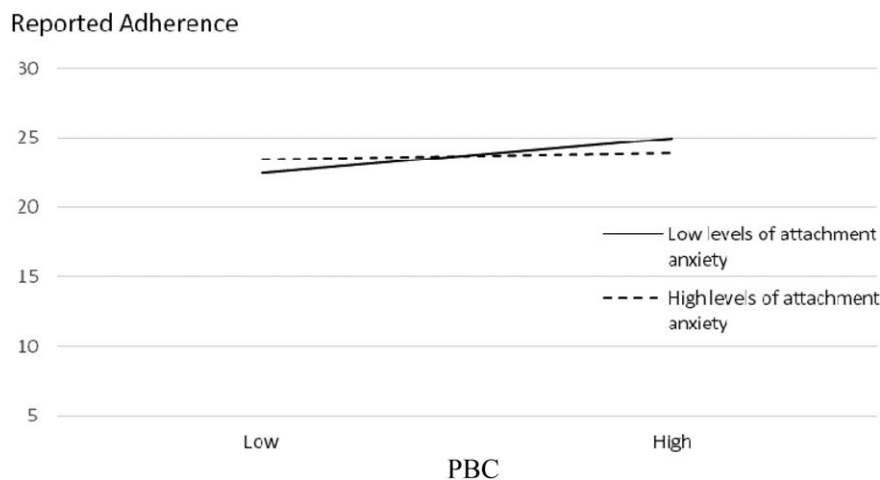
Figure 4 PBC × Attachment Anxiety interaction in predicting reported adherence to medication recommendations. PBC = perceived behavioral control.
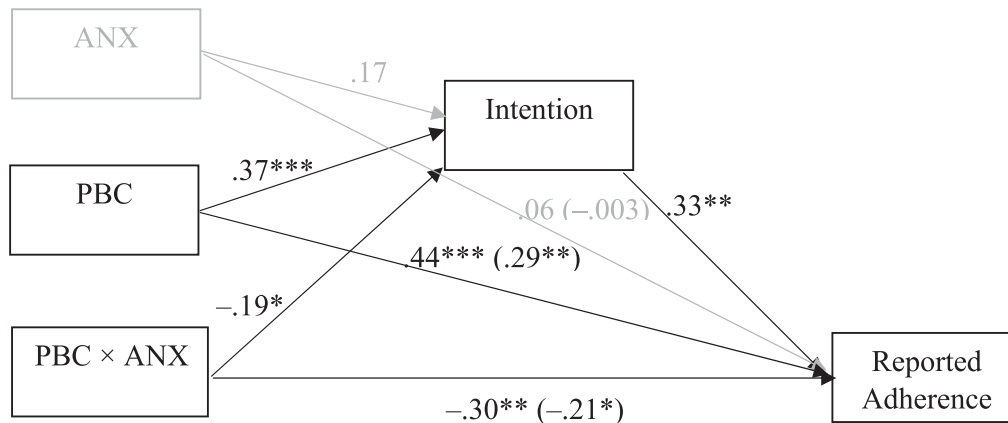
Figure 5 Mediated moderation model predicting adherence from the PBC × Attachment Anxiety interaction through intention. The numbers in parentheses represent the coefficients when intention was entered into the analyses. PBC = perceived behavioral control; ANX = attachment anxiety. *p < .05. **p < .01. ***p < .001.

medications, and thus very low variability within this component seems to exist. In the same vein, and again contrary to our prediction, the moderation effect regarding subjective norms (and attitudes) was not found to affect adherence (through the mediation of intention). One possible explanation for these null effects may be the fact that the current study was relatively low-powered, due to its small sample size, which was even smaller when reported behavior was examined 6 months post-discharge.

It is important to note that no significant direct associations were found among any of the attachment orientations and either intentions or reported behavior. These null findings strengthen our claim that attachment plays the role of a moderator of a variety of mental processes that ultimately influence behavioral motivations and actual acts. Indeed, despite the study's relatively low power, we were able to detect two significant interactions out of the four that were hypothesized to predict intentions: PBC × ANX (which was consistent with our hypothesis), and Subjective Norms × AVO (which was not consistent with our hypothesis). In addition, an Attitudes × ANX interaction was also found, although no a priori hypothesis was suggested. For predicting reported behavior, we found one (out of the four that were hypothesized) significant interaction effect, PBC × ANX, which was consistent with our suggestion.

Specifically, consistent with the study's contentions, it was found that attachment anxiety moderated the associations between PBC and both intention and reported adherence. The significant interactions that were found with the anxious attachment orientation show that PBC becomes more positively associated with both outcome measures the lower the levels of anxious attachment are. These results may imply that PBC is not a potent motivator for intentions and adherence among highly anxiously attached individuals, probably because this group is characterized by a negative model of the self, difficulty in relying on their own opinions, and consistent preoccupation with the opinions of others (Mikulincer & Shaver, 2007).

Contrary to our prediction, no significant interaction between PBC and avoidance was detected. One explanation for this null

finding may be that when faced with a stressful situation such as an acute cardiac event, individuals high on the avoidance continuum tend to rely on their own internal resources (e.g., PBC) in much the same way individuals low on this continuum do. Relying on one's own resources is in line with avoiders' deactivating strategy, that is, extreme self-reliance (Mikulincer & Shaver, 2007), which in the current situation proves to be beneficial and health promoting, the same as it is for individuals low on avoidant attachment. Yet another explanation for the null interaction effect may be that despite the differences that exist between high- and low-avoidant-attached individuals, they could not be found in this sample due to a ceiling effect. Specifically, since the means of both intentions and adherence were high to begin with, the added value of avoidant attachment in the translation of PBC into behavioral outcomes may have been too small to be detected.

A different pattern, in which the deactivating strategy of highly avoidant individuals was detected, emerged when subjective norms were assessed. Whereas subjective norms were not directly associated with, nor did they interact with, anxious attachment in explaining intentions, subjective norms were found to be *negatively* associated with intention when the levels of avoidant attachment were high (as compared to low). That is, the more that individuals high on avoidance perceived that others were in favor of their medication adherence, the *less* they intended to adhere. This finding may be understood in light of former findings showing that avoidant individuals tend to be less inclined to rely on others in times of need (Hunter & Maunder, 2001), and to minimize that which they have in common with others in order to maximize their distance from them, as part of their affect regulation deactivation strategies (Mikulincer, Orbach, & Iavnieli, 1998). These individuals cognitively block any dependency they may have on others' opinions as a means of maintaining their defensive abstinence; it is therefore not surprising that a negative effect of subjective norms on intention among highly avoidant individuals was detected. Moreover, avoidant patients may have a negative response to social norms because they perceive these norms as a kind of "pressure" to

conform. This suggestion is consistent with studies conducted among diabetic patients (e.g., Brenk-Franz et al., 2015) that found that the avoidant orientation was negatively related to social support (Ciechanowski, Katon, Russo, & Walker, 2001). Overall, not only were subjective norms not found to act as a facilitator for medication adherence in the current sample, but they were found to function as an *inhibitor* for those individuals high on avoidant attachment.

As in the case of PBC, the insignificant interaction between subjective norms and attachment anxiety can be explained by the high means and low standard deviations in both the subjective norms component and the behavioral outcomes. This scenario may have attenuated any significant positive correlations, and it was only decreases in behavioral outcomes (as were identified in the Subjective Norms × AVO interaction) that were detected.

Although no hypothesis regarding attitudes was suggested a priori, it was found that positive attitudes regarding adherence to medication were associated with more favorable intentions, and this effect was stronger among anxiously attached individuals than among individuals low on anxious attachment. It seems that viewing medication taking as something that is wise, good, and necessary—versus silly, bad, and unnecessary—contributes to anxiously attached individuals' motivation to act upon this behavior more than it motivates individuals who are low on the anxiety orientation. In order to understand this finding, patients' behavioral beliefs regarding adhering to medication recommendations should be assessed. That is, since attitudes, according to the TPB, are a result of one's beliefs regarding the behavior in question (Ajzen, 1985), it is possible that anxious and avoidant patients' attitudes are based on different beliefs (e.g., Feeney, Noller, & Patty, 1993; Tracy, Shaver, Albino, & Cooper, 2003). Specifically, identifying the behavioral beliefs that underlie the attitudes of anxiously attached patients may help us better understand how their reliance on these attitudes is part of the fulfillment of their attachment needs.

When observing the current findings integratively, a consistent pattern is detected with regard to the interplay between attachment and social-cognitive motivators to action. According to the attachment theory, in times of stress, secondary attachment strategies are activated in a different manner for individuals high on attachment anxiety than they are for individuals high on avoidance attachment. Whereas highly anxiously attached persons present hyper-activation of the attachment behavioral system and thus act in a needy and excessive way in order to gain proximity, support, and reassurance from others, highly avoidant persons enact a deactivation process that manifests itself in extreme self-reliance and distancing (Mikulincer & Shaver, 2009). In the current study, we detected that only the subjective norms component induced a negative effect on intention among highly avoidant individuals. Indeed, this is the only component in the TPB that reflects one's reliance on others. The other two components of the model (PBC and attitudes) are perceived as internal cognitive resources and therefore function as prompters to action among highly avoidant individuals. Just as they do among low-avoidant individuals, subjective norms

cease to function as a motivator for highly avoidant individuals; the fact that it does not function as such may reflect highly avoidant individuals' unconscious deactivation of everything that might remind them of being dependent on others. In the same vein, highly anxiously attached individuals were unable to convert PBC into motivation to act due to their difficulty in relying on their own resources. Attitudes, by contrast, which may possibly reflect certain attachment beliefs that require further examination, seem to motivate highly anxiously attached individuals.

LIMITATIONS AND PRACTICAL IMPLICATIONS

Despite the current study's strengths (e.g., a longitudinal, prospective design) several possible limitations should be noted. First, the results are limited by sampling bias. Since this study focused only on men who are currently in a relationship, it would be important to examine the study hypotheses among men who are not in a relationship and among female patients as well. It should be noted that the current study was part of a large-scale dyadic study in which we deliberately refrained from including female cardiac patients. A first ACS among women tends to occur more often as women get older, are more likely to be widowed, and are less likely to be part of a conjugal relationship, the last of which was the focus of the original large-scale research. Furthermore, since all patients were in a committed relationship, the range of insecure attachment orientations (either anxious or avoidant) in the present study may have been underrepresented, given that previous findings indicate individuals in romantic relationships are less anxious and avoidant than are single individuals (e.g., Edelstein & Gillath, 2008). Related to this point, it is important to note that the interpretation of one standard deviation above and below the mean when probing significant interactions (Preacher et al., 2006) does not necessarily indicate high or low levels of anxiety or avoidance. In addition, although all participants in this study were in close relationships, no partner effects were assessed, since an examination of this kind would have been beyond the scope of the present study. Future studies are advised to further assess dyad-related effects. Other variables such as the number and types of medications that were prescribed for participants, as well as duration of hospitalization, should also be assessed in future studies as potential covariates.

Another limitation refers to the subjective norms component of the TPB, which was measured in the present study using a single-item measure. This limitation may have prevented the emergence of different patterns of results. That is, perceived norms of what specific others (e.g., family, friends, other patients) expect, as well as a measurement of one's motivation to comply with these expectations, may have resulted in different findings. On a related matter, we relied on patients' subjective perceptions regarding their tendency to adhere to the medications prescribed for them. These reports might have been biased by social desirability (Osterberg & Blaschke, 2005), as

most of the patients reported high levels of adherence. Although we used a measure that is considered to be a sensitive tool for assessing medication adherence behaviors (Horne & Hankins, 2004), and which has been found to be related to objective measures such as blood test results ($r = .60$) among participants with diagnoses of psychoses (Thompson, Kulkarni, & Sergejew, 2000) and adherence as measured by electronic documentation ($r = .42$) among asthmatic adults (Cohen et al., 2009), future studies are advised to assess adherence using more objective methods. Another explanation for the high levels of reported adherence may be that assessing adherence 6 months after the event is too soon to capture differences in adherence, since the threat is still vivid and most people are likely to adhere. Therefore, future studies are advised to use an additional, more distant measurement time point (e.g., 2 years after discharge). Yet it is important to note that even the slightest improvement in patients' medication adherence is crucial in terms of rates of cardiac event recurrence, and even rates of mortality (Bitton, Choudhry, Matlin, Swanton, & Shrank, 2013).

CONCLUSIONS

Overall, the current study contributes to efforts to enhance patients' medication adherence. Given that estimations of PBC at hospitalization were found to be predictive of intention and future behavior, it is recommended that efforts to augment individuals' PBC be taken during their hospitalization. Such augmentation might be achieved by focusing on individuals' perceptions of potential barriers to taking control of their situation (e.g., they don't wish to spend time filling prescriptions, taking their medications) and on strategies for addressing and overcoming them. Specifically, successful medication adherence might be achieved through detailed planning of when (e.g., at which time/hours to take the medications), how (e.g., how to be reminded to take the medications), and where (e.g., where to keep the medications; Darker, French, Eves, & Sniehotta, 2010). These efforts, according to our results, may benefit individuals low on anxious attachment, who are more responsive to PBC, but may not benefit highly anxiously attached individuals. For this latter group, attachment-related issues (e.g., conflicts with spouses, ineffective social support seeking, high levels of physiological arousal) would need to be addressed in order for PBC-enhancing strategies to be effective. In addition, for highly avoidant individuals, highlighting the importance of subjective norms might be counterproductive, and therefore this strategy should be avoided in their case. Overall, interventions based on the TPB are advised to be specifically tailored to patients on the basis of their particular personality constructs.

Declaration of Conflicting Interests

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

References

ACSIS. (2010). Acute coronary syndrome Israeli survey March–April 2010: Survey findings and temporal trends 2000–2010 (ACSIS Publication No. 337). Retrieved from http://www.health.gov.il/PublicationsFiles/ACSIS%202010.pdf

Ajzen, I. (1985). From intentions to actions: A theory of planned behavior. In J. Kuhl & J. Beckmann (Eds.), *Action control: From cognition to behavior* (pp. 11–39). Berlin: Springer.

Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes*, **50**, 179–211.

Ajzen, I. (2011). The theory of planned behaviour: Reactions and reflections. *Psychology & Health*, **26**, 1113–1127.

Ajzen, I., & Fishbein, M. (1980). *Understanding attitudes and predicting social behavior*. Englewood Cliffs, NJ: Prentice Hall.

Armitage, C. J., & Conner, M. (2001). Efficacy of the theory of planned behaviour: A meta-analytic review. *British Journal of Social Psychology*, **40**, 471–499.

Baigent, C., Blackwell, L., Collins, R., Emberson, J., Godwin, J., Peto, R., et al. (2009). Aspirin in the primary and secondary prevention of vascular disease: Collaborative meta-analysis of individual participant data from randomized trials. *Lancet*, **373**, 1849–1860.

Bitton, A., Choudhry, N. K., Matlin, O. S., Swanton, K., & Shrank, W. H. (2013). The impact of medication adherence on coronary artery disease costs and outcomes: A systematic review. *American Journal of Medicine*, **126**, 357.e7–357.e27.

Bodie, G. D., Burleson, B. R., Gill-Rosier, J., McCullough, J. D., Holmstrom, A. J., Rack, J. J., et al. (2010). Explaining the impact of attachment style on evaluations of supportive messages: A dual-process framework. *Communication Research*, **38**, 228–247.

Bowlby, J. (1969). *Attachment and loss. Volume I: Attachment*. London: Hogarth Press.

Brenk-Franz, K., Strauss, B., Tiesler, F., Fleischhauer, C., Ciechanowski, P., Schneider, N., et al. (2015). The influence of adult attachment on patient self-management in primary care—The need for a personalized approach and patient-centered care. *PloS One*, **10**, e0136723.

Brennan, K., Clark, C., & Shaver, P. (1998). Self-report measurement of adult attachment: An integrative overview. In J. Simpson & W. Rholes (Eds.), *Attachment theory and close relationships* (pp. 46–76). New York: Guilford Press.

Chisholm, M. A., Williamson, G. M., Lance, C. E., & Mulloy, L. L. (2007). Predicting adherence to immunosuppressant therapy: A prospective analysis of the theory of planned behaviour. *Nephrology, Dialysis, Transplantation: Official Publication of the European Dialysis and Transplant Association–European Renal Association*, **22**, 2339–2348.

Ciechanowski, P. S., Katon, W. J., Russo, J. E., & Walker, E. A. (2001). The patient-provider relationship: Attachment theory and adherence to treatment in diabetes. *American Journal of Psychiatry*, **158**, 29–35.

Cicero, V., Lo Coco, G., Gullo, S., & Lo Verso, G. (2009). The role of attachment dimensions and perceived social support in predicting adjustment to cancer. *Psycho-Oncology*, **18**, 1045–1052.

Ciechanowski, P. S., Walker, E. A., Katon, W. J., & Russo, J. E. (2002). Attachment theory: A model for health care utilization and somatization. *Psychosomatic Medicine*, **64**, 660–667.

Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). Hillsdale, NJ: Erlbaum.

Cohen, J. L., Mann, D. M., Wisnivesky, J. P., Horne, R., Leventhal, H., Musumeci-Szabó, T. J., et al. (2009). Assessing the validity of self-reported medication adherence among inner-city asthmatic adults: The Medication Adherence Report Scale for Asthma. *Annals of Allergy, Asthma & Immunology*, **103**, 325–331.

Cutrona, C. E. (1996). *Social support in couples*. Thousand Oaks, CA: Sage.

Darker, C., French, D., Eves, F., & Sniehotta, F. (2010). An intervention to promote walking amongst the general population based on an 'extended' theory of planned behaviour: A waiting list randomized controlled trial. *Psychology & Health*, **25**, 71–88.

Edelstein, R. S., & Gillath, O. (2008). Avoiding interference: Adult attachment and emotional processing biases. *Personality and Social Psychology Bulletin*, **34**, 171–181.

Feeney, J. A., Noller, P., & Patty, J. (1993). Adolescents' interactions with the opposite sex: Influence of attachment style and gender. *Journal of Adolescence*, **16**, 169–186.

Fishbein, M., & Ajzen, I. (1975). *Belief, attitude, intention and behavior: An introduction to theory and research*. Reading, MA: Addison-Wesley.

Gatt, S., & Sammut, R. (2008). An exploratory study of predictors of self-care behaviour in persons with type 2 diabetes. *International Journal of Nursing Studies*, **45**, 1525–1533.

George-Levi, S., Vilchinsky, N., Tolmacz, R., Khaskiaa, A., Mosseri, M., & Hod, H. (2016). "It takes two to take": Caregiving style, relational entitlement, and medication adherence. *Journal of Family Psychology*, **30**, 743.

Go, A. S., Mozaffarian, D., Roger, V. L., Benjamin, E. J., Berry, J. D., Borden, W. B., et al. (2013). Executive summary: Heart disease and stroke statistics—2013 update. A report from the American Heart Association. *Circulation*, **127**, 143–146.

Go, A. S., Mozaffarian, D., Roger, V. L., Benjamin, E. J., Berry, J. D., Blaha, M. J., et al. (2014). Executive summary: Heart disease and stroke statistics—2014 update. A report from the American Heart Association. *Circulation*, **129**, 399–410.

Graham, J. W. (2009). Missing data analysis: Making it work in the real world. *Annual Review of Psychology*, **60**, 549–576.

Hagger, M. S., Chatzisarantis, N., Biddle, S. J., & Orbell, S. (2001). Antecedents of children's physical activity intentions and behaviour: Predictive validity and longitudinal effects. *Psychology & Health*, **16**, 391–407.

Harris, J., & Hagger, M. S. (2007). Do basic psychological needs moderate relationships within the theory of planned behavior? *Journal of Applied Biobehavioral Research*, **12**, 43–64.

Hayes, A. F. (2012). *PROCESS: A versatile computational tool for observed variable mediation, moderation, and conditional process modeling* [White paper]. Retrieved from http://www.afhayes.com/public/process2012.pdf

Horne, R., & Hankins, M. (2004). *The Medication Adherence Report Scale*. Brighton, UK: University of Brighton.

Hunter, J. J., & Maunder, R. G. (2001). Using attachment theory to understand illness behavior. *General Hospital Psychiatry*, **23**, 177–182.

Maunder, R., & Hunter, J. (2015). *Love, fear, and health: How our attachments to others shape health and health care*. Toronto, Canada: University of Toronto Press.

Markey, C. N., & Markey, P. M. (2014). Personality, relationships, and health. *Journal of Personality*, **82**, 467–471.

Maunder, R. G., & Hunter, J. J. (2009). Assessing patterns of adult attachment in medical patients. *General Hospital Psychiatry*, **31**, 123–130.

McEachan, R. R. C., Conner, M., Taylor, N. J., & Lawton, R. J. (2011). Prospective prediction of health-related behaviours with the theory of planned behaviour: A meta-analysis. *Health Psychology Review*, **5**, 97–144.

Mikulincer, M., Orbach, I., & Iavnieli, D. (1998). Adult attachment style and affect regulation: Strategic variations in subjective self–other similarity. *Journal of Personality and Social Psychology*, **75**, 436.–448

Mikulincer, M., & Shaver, P. R. (Eds.). (2007). *Attachment patterns in adulthood: Structure, dynamics, and change*. New York: Guilford Press.

Mikulincer, M., & Shaver, P. R. (2009). An attachment and behavioral systems perspective on social support. *Journal of Social and Personal Relationships*, **26**, 7–19.

Mikulincer, M., Shaver, P. R., & Pereg, D. (2003). Attachment theory and affect regulation: The dynamics, development, and cognitive consequences of attachment-related strategies. *Motivation and Emotion*, **27**, 77–102.

Mills, E. J., O'Regan, C., Eyawo, O., Wu, P., Mills, F., Berwanger, O., et al. (2011). Intensive statin therapy compared with moderate dosing for prevention of cardiovascular events: A meta-analysis of >40 000 patients. *European Heart Journal*, **32**, 1409–1415.

Naderi, S. H., Bestwick, J. P., & Wald, D. S. (2012). Adherence to drugs that prevent cardiovascular disease: Meta-analysis on 376,162 patients. *American Journal of Medicine*, **125**, 882–887.

Osterberg, L., & Blaschke, T. (2005). Adherence to medication. *New England Journal of Medicine*, **353**, 487–497.

Pietromonaco, P. R., Uchino, B., & Dunkel Schetter, C. (2013). Close relationship processes and health: Implications of attachment theory for health and disease. *Health Psychology*, **32**, 499–513.

Plotnikoff, R. C., Lubans, D. R., Costigan, S. A., Trinh, L., Spence, J. C., Downs, S., et al. (2011). A test of the theory of planned behavior to explain physical activity in a large population sample

of adolescents from Alberta, Canada. *Journal of Adolescent Health*, **49**, 547–549.

Preacher, K. J., Curran, P. J., & Bauer, D. J. (2006). Computational tools for probing interactions in multiple linear regression, multi-level modeling, and latent curve analysis. *Journal of Educational and Behavioral Statistics*, **31**, 437–448.

Quine, L., Steadman, L., Thompson, S., & Rutter, D. R. (2012). Adherence to anti-hypertensive medication: Proposing and testing a conceptual model. *British Journal of Health Psychology*, **17**, 202–219.

Rhodes, R. E., Courneya, K. S., & Hayduk, L. A. (2002). Does personality moderate the theory of planned behavior in the exercise domain? *Journal of Sport & Exercise Psychology*, **24**, 120–132.

Rhodes, R. E., Courneya, K. S., & Jones, L. W. (2005). The theory of planned behavior and lower-order personality traits: Interaction effects in the exercise domain. *Personality and Individual Differences*, **38**, 251–265.

Shaver, P. R., & Mikulincer, M. (2007). Adult attachment strategies and the regulation of emotion. In J. J. Gross (Ed.), *Handbook of emotion regulation* (pp. 446–465). New York: Guilford Press.

Shaw, B. A., Krause, N., Liang, J., & Bennett, J. (2007). Tracking changes in social relations throughout late life. *Journals of Gerontology: Series B*, **62**, S90–S99.

Sud, A., Kline-Rogers, E. M., Eagle, K. A., Fang, J., Armstrong, D. F., Rangarajan, K., et al. (2005). Adherence to medications by patients after acute coronary syndromes. *Annals of Pharmaco-therapy*, **39**, 1792–1797.

Sutton, S. (1998). Predicting and explaining intentions and behavior: How well are we doing? *Journal of Applied Social Psychology*, **28**, 1317–1338.

Thompson, K., Kulkarni, J., & Sergejew, A. A. (2000). Reliability and validity of a new Medication Adherence Rating Scale (MARS) for the psychoses. *Schizophrenia Research*, **42**, 241–247.

Tracy, J. L., Shaver, P. R., Albino, A. W., & Cooper, M. L. (2003). Attachment styles and adolescent sexuality. In P. Florsheim (Ed.), *Adolescent romance and sexual behavior: Theory, research, and practical implications* (pp. 137–159). Mahwah, NJ: Erlbaum.

Vilchinsky, N., Dekel, R., Asher, Z., Leibowitz, M., & Mosseri, M. (2013). The role of illness perceptions in the attachment-related process of affect regulation. *Anxiety, Stress & Coping*, **26**, 314–329.

Vilchinsky, N., Dekel, R., Revenson, T.A., Liberman, G., & Mosseri, M. (2015). Cardiac caregivers' burden and depressive symptoms: The moderational role of attachment orientations. *Health Psychology*, **34**, 262–269.

Vilchinsky, N., Haze-Filderman, L., Leibowitz, M., Reges, O., Khaskia, A., & Mosseri, M. (2010). Spousal support and cardiac patients' distress: The moderating role of attachment orientation. *Journal of Family Psychology*, **24**, 508–512.