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Keywords:	Independence Goals, Lines of Defense, Social Support, Couples, Prostate Cancer
Abstract:	<p>Background. When patients recover from disease-related functional limitations, support received from partners may not always match patients' changing independence goals. Prostate cancer patients' independence goals, or lines of defense, were tested as moderators of the association between partner support and patients' and partners' affect during patients' recovery from postsurgical functional limitations.</p> <p>Methods. Data from 169 couples were assessed at four measurement points within seven to eight months following patients' tumor surgeries. Patients completed questionnaires on post-surgery functional limitations (i.e., incontinence), lines of defense, affect, and received partner social support. Partners reported on affect and support provided to patients.</p> <p>Results. In patients with less ambitious lines of defense, higher levels of received support were associated with lower negative affect. Also, not endorsing overambitious lines of defense while receiving strong partner support was related to patients' lower negative and higher positive affect. Partners' support provision to patients tended to be associated with increases in partners' negative affect when patients had endorsed more ambitious lines of defense and with increases in positive affect when patients had endorsed less ambitious lines of defense.</p> <p>Conclusions. Findings indicate that matching lines of defense of patients with partners' support is beneficial for patients' and partners' affective well-being.</p>

Running head: INDEPENDENCE GOALS AND PARTNER SUPPORT

Abstract

Background. When patients recover from disease-related functional limitations, support received from partners may not always match patients' changing independence goals. Prostate cancer patients' independence goals, or *lines of defense*, were tested as moderators of the association between partner support and patients' and partners' affect during patients' recovery from postsurgical functional limitations.

Methods. Data from 169 couples were assessed at four measurement points within seven to eight months following patients' tumor surgeries. Patients completed questionnaires on post-surgery functional limitations (i.e., incontinence), lines of defense, affect, and received partner social support. Partners reported on affect and support provided to patients.

Results. In patients with less ambitious lines of defense, higher levels of received support were associated with lower negative affect. Also, not endorsing overambitious lines of defense while receiving strong partner support was related to patients' lower negative and higher positive affect. Partners' support provision to patients tended to be associated with increases in partners' negative affect when patients had endorsed more ambitious lines of defense and with increases in positive affect when patients had endorsed less ambitious lines of defense.

Conclusions. Findings indicate that matching lines of defense of patients with partners' support is beneficial for patients' and partners' affective well-being.

Keywords: Independence Goals, Lines of Defense, Social Support, Couples, Prostate Cancer

Calibrating Independence Goals and Partner Support:

Couples Adjust to Functional Limitations After Tumor Surgery

Disease-related and post-surgery functional limitations pose substantial challenges to patients and their partners. Patients need to flexibly adjust their goals for regaining functioning to the concurrent functional limitations and their change over time. The complexity of this self-regulatory challenge may be reduced or enhanced by their social partners -- typically their spouse -- providing care and support. In this study, prostate cancer patients' health-related independence goals, so-called lines of defense (Heckhausen, 2005; Heckhausen, Wrosch, & Schulz, 2013), were investigated as moderators of the associations between support interactions and their assumed consequences for both patients' and partners' affective well-being. Couples were examined in the context of patients' convalescence from post-surgical functional limitations following radical prostatectomy.

The Lines of Defense (LoD) Model

Heckhausen's (2005; Heckhausen et al., 2013) *lines of defense model* proposes that during adaptation to changing health and functional capacity, individuals pursue health-related independence goals that are hierarchically organized, reflecting successive lines of defense (LoDs). LoDs are chosen in accordance with the individuals' control capacity. Control capacity refers to the "extent to which the individual realizes control over his/her environment (i.e., primary control) across different domains of life and across the life-span" (Heckhausen et al., 2013, p. 35). From a health-domain perspective, control capacity can be severely limited by disease and associated functional limitations (Schulz & Heckhausen, 1996; Wahl, Becker, & Burmedi) or enhanced by recovery and rehabilitation from disease (xxx, in press), both times prompting the adjustment of goals for independence and

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3 functioning. For the case of deteriorating health, the LoD Model¹ proposes that as long as
4 health is good, the individual will strive to *avoid disease or disability* (highest LoD). Once
5 chronic disease sets in and accompanying functional limitations are no longer avoidable, the
6 *protection of self-reliance* becomes the next LoD. If the disease progresses and independence
7 becomes severely challenged, the next adaptive LoD should be to *use help and aids to*
8 *maintain functional ability*. Finally, *minimizing discomfort* as well as *delaying death* (lowest
9 LoD) are assumed to be the last resorts of control when health takes an (irreversible)
10 downturn. Within this framework, an individual experiencing progressive decline with a given
11 illness will select the appropriate level of functioning to strive for and hold on to this level as
12 long as possible. The individual should disengage from a more ambitious LoD when it is no
13 longer maintainable and only then engage with the next lower LoD. On the other hand, when
14 health improves, for instance during convalescence and rehabilitation, individuals should
15 readjust their independence goals upwardly, i.e. towards higher LoDs, and claim more
16 ambitious functioning as soon as control capacity increases again (XXX, in press).
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34 Fortunately for many, the above-described challenging process of goal adjustment in the
35 face of changing disease-related functional impairment does not take place in social isolation,
36 but is attended and supported by close others, usually partners (Resendes & McCorkle, 2006).
37 Although this often produces beneficial synergistic effects, it may also interfere with the
38 recovering partners' self-regulatory efforts (Gray, Fitch, Phillips, Labreque, & Fergus, 2000).
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45 **Partner Support: Match or Mismatch with Changing Lines of Defense?**

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47 Whereas partners' support is usually much appreciated and appraised as useful by
48 support recipients (Rini & Dunkel-Schetter, 2010), its efficacy in promoting patients'
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52
53 ¹ Note that the present study was based on a version of the LoD-model first proposed by
54 Heckhausen (2005). Meanwhile, Heckhausen et al. (2013) proposed a more differentiated and
55 elaborated revised model.
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Running head: INDEPENDENCE GOALS AND PARTNER SUPPORT

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3 adjustment may sometimes fall short (e.g., Martire, Stephens, Druley, & Wojno, 2002;
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5 Martire, Stephens, & Schulz, 2011). Predictors for inefficacious support attempts with regard
6
7 to recipients' well-being are manifold and can include prolonged phases of inequity of
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9 supportive interaction among partners (Knoll, Burkert, Roigas, & Gralla; Kuijer, Buunk, &
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11 Ybema, 2001), misfits between types of support provided and types of support required by the
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13 recipient (e.g., Cutrona & Russell, 1990), or wrongly dosed support (Brock & Lawrence,
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15 2009). The latter is likely to happen when there is a discrepancy between patients' and
16
17 partners' perceptions of patients' functional ability, such as caregivers' overestimation of
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19 patients' functional limitations resulting in overprotection (Coyne, Ellard, & Smith 1990;
20
21 Hagedoorn, Kuijer, Buunk, De Jong, Wobbes, & Sanderman, 2000). Also, there is a risk for
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23 wrongly dosed support attempts when patients' strivings for independence are not correctly
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25 observed by their caregivers. For instance, Martire and colleagues (2002, 2011) found in two
26
27 studies that persons with osteoarthritis for whom functional independence was central (i.e.
28
29 who were used to being highly independent in the pursuit of their daily activities) reacted
30
31 negatively to received support by their partners in terms of well-being, functional ability, and
32
33 pain self-efficacy. Similarly, Nagurney, Reich, and Newsom (2004) reported that a higher
34
35 desire for independence coupled with high amounts of received support were related with
36
37 worse affect and self-esteem in older men, but not women with health-related functional
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39 impairment. Difficulties in meeting the independence needs of a person who copes with
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41 functional impairment and making support available at the same time were also indirectly
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43 illustrated by findings by Cimarolli, Boerner, Reinhardt, and Horowitz (2013). In older
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45 individuals with vision loss, authors identified longitudinal relations between perceived
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47 overprotection on the one side and instrumental support on the other. While perceived
48
49 overprotection was initially associated with instrumental support, this association disappeared
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51 over the course of 12 months, yet, perceived overprotection increased during this time.
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3 The difficulties of calibrating caregiver support to patient needs may even be augmented
4 for both partners when patients' perceived level of independence and functional ability
5 fluctuate over time or increase such as during rehabilitation. Findings by Gray and colleagues
6 (2000) from a qualitative longitudinal study with prostate cancer patients and their spouses
7 indicated that changes in patients' independence goals during rehabilitation from treatment
8 may interfere with the efficacy of supportive interactions on both sides of the support dyad.
9 Findings showed that patients struggled to regulate their emotions and perform daily
10 activities, vacillating between independence and need for support to reduce the impact of the
11 illness' and treatment's sequelae on everyday life. At the same time, their partners were
12 distressed by caring and being supportive while also respecting their partners' need for
13 independence.
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17 Although evidence is accumulating on the necessary characteristics of support that
18 furthers recipients' perceptions of autonomy (i.e., autonomy support; Ryan & Deci, 2000;
19 Warner et al., 2011), to date relatively little is known about the role of recipients'
20 independence goals in support interactions in the context of *changing* illness-related
21 functional limitations. In this study, Heckhausen's (2005; Heckhausen et al., 2013) lines of
22 defense model is used to investigate the role of patients' health-related independence goals, or
23 LoDs, as potential moderators of the association between partner support and affective well-
24 being of prostate cancer patients and their partners.
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27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 **Incontinence Following Radical Prostatectomy: Challenges to Functional Capacity and** 46 47 **Independence**

48
49 Radical prostatectomy (RP) is a standard treatment for prostate cancer that involves the
50 surgical removal of the prostate gland. Frequent postoperative sequelae include urinary
51 incontinence and erectile dysfunctions (e.g., Resnick et al., 2013). As long as incontinence
52 persists, patients typically report more limitations in the maintenance of functional capacity
53 due to incontinence than due to sexual dysfunction (Resendes & McCorkle, 2006).
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3 Accordingly, the present study focused on patients' adaptation to the onset and gradual
4
5 recovery from incontinence following surgery.
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8 Incontinence sets in following the removal of a postsurgery catheter. Although in 80%
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10 to 90% of patients, incontinence recedes within the following 6 to 12 months, to date, aside
11
12 from factors such as patient age or mode of operation, relatively little is known about
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14 predictors of its duration and course (Prabhu, Sivarajan, Taksler, Laze, & Lepor, in press;
15
16 Resnick et al., 2013). Moreover, about 10% of patients remain incontinent beyond 12 and
17
18 even 24 months following RP (Resnick et al., 2013). Findings indicate that postoperative
19
20 incontinence is related to lower functional capacity and lower overall health-related quality of
21
22 life in patients, especially within the first six months following surgery (e.g., Eton & Lepore,
23
24 2002; Resendes & McCorkle, 2006). While incontinence persists, patients use technical aids
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26 (e.g., sanitary pads) and initially restrict their daily activities to environments with sanitary
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28 facilities for a change of pads and/or clothes.
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32 Following the onset of incontinence, patients often utilize support from their partners to
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34 maintain functional capacity, including delegation of chores to partners, securing availability
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36 of supplies for management of incontinence, but also to disclose their emotions, to seek
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38 reassurance, and to discuss decisions concerning the treatment's sequelae (Gray et al., 2000,
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40 Resendes & McCorkle, 2006). When incontinence subsides during recovery, the utilization of
41
42 caregiver support also decreases (e.g., Knoll, Burkert, Luszczynska, Roigas, & Gralla, 2011).
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46 Moreover, an earlier report on parts of the present data (xxx, in press) about
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48 developments of patients' endorsements of lines of defense (LoDs) during rehabilitation from
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50 incontinence following RP has shown that patients' incontinence and LoDs were closely
51
52 linked. While incontinence receded during the first 7 to 8 months following surgery, patients
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54 were generally striving for higher self-reliance as indicated by upward adjustments of LoDs
55
56 over time.
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58 **Aim and Hypotheses**

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3 The aim of this study was to investigate whether the association between support for
4 patients and patients' and partners' affective well-being depends on the LoD the patient is
5 currently engaged with. It was expected that higher levels of support are associated with
6 worse affect in patients and partners if patients are currently engaged with more ambitious
7 LoDs. Moreover, we expected that a better match between patients' less ambitious LoDs and
8 support may not only protect patients' but also partners' affect, as it might reduce doubts
9 about the appropriateness of the provided assistance and make support provision more
10 effective.
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20 To adapt Heckhausen's (2005) LoDs to the context of rehabilitation from sequelae
21 following prostatectomy, only three of the originally proposed LoDs (cf. Heckhausen, 2005)
22 were used and one goal was split up, resulting in the following subset of four LoDs, that will
23 henceforth be referred to as LoD1 through LoD4: (LoD1) *protect self-reliance* (highest LoD),
24 that is, pursuing daily activities without technical aids or external help; (LoD2) *rely on*
25 *technical aids, such as sanitary pads, to maintain functional ability*; (LoD3) *rely on technical*
26 *aids and help from others to maintain functional ability* (LoDs 2 and 3 represent the split-up
27 version of the original LoD3; cf. Heckhausen, 2005); *LoD4: minimize discomfort by*
28 *disengagement*, that is, rather give up activities than fearing negative consequences of
29 incontinence. As reported above, data on LoDs were previously used in a study that focused
30 on patterns of LoD endorsements using a latent class approach, patients' transitions between
31 LoD classes over time, and associations between class membership and concurrent levels of
32 incontinence (cf. xxx, in press).
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49 In the present study, the following hypotheses were tested:

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51 *Hypothesis 1.* If higher levels of received partner support match with patients' LoDs
52 (i.e., LoD3: *rely on aids and help*, or LoD4: *minimize discomfort by disengagement*) patients
53 should experience better affective well-being (i.e., more positive, less negative affect). If there
54 is a mismatch between high levels of received support and patients' more ambitious LoDs
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(i.e., LoD1: *protect self-reliance*, or LoD2: *rely on technical aids*) patients should report worse affect.

Hypothesis 2. Better affective well-being is also expected in partners whose strong support provision fits with patients' more modest LoDs (i.e., LoD3: *rely on aids and help*, or LoD4: *minimize discomfort by disengagement*). A mismatch between patients' more ambitious LoDs (i.e., LoD1: *protect self-reliance*, or LoD2: *rely on aids*) and partners' strong support provision should be associated with worse affective well-being in partners.

Method

Participants and Procedure

A total of 209 patients receiving radical prostatectomy and their heterosexual partners were enrolled in the study. Recruitment of couples took place in two departments of urology in a large metropolitan area in Germany. Data were collected between 2009 and 2011. Overall inclusion criteria were undergoing radical prostatectomy and living in a stable relationship with a partner. Exclusion criteria were not giving informed consent, not having a partner, the partner's refusal to participate in the study, and insufficient comprehension of the German language. Couples received a compensation of 110 Euros for full participation.

Of the 209 couples enrolled in the study, 169 couples (80.86%) returned some data at all measurement points in time. See Figure 1 for more information on the participant flow.

Where data were available, couples who provided data at all assessments (continuers: coded 1) and those who did not (dropouts: coded 0) differed with regard to: patient-reported level of depressive symptoms (lower in continuers; $r = -.18, p < .05$) and difficulty with performing activities of daily living (lower in continuers; $r = -.24, p < .05$); number of partners' children (lower in continuers; $t(31.08) = 1.98, p < .10$), and number of children living with their parents (lower in continuers; $r = -.15, p < .05$), partner-reported vocational training (degree from a school providing higher vocational education: less often in continuing couples; $r = -.18, p < .05$), and number of comorbidities (higher in continuers; $r = .14, p < .10$). Unique

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3 effects of these dropout-correlates were examined using a logistic regression with dropout-
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5 correlates as independent variables and a binary coded couple dropout variable as the
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7 outcome. Two unique effects emerged for partner-reported vocational training and patient-
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9 reported difficulty with performing activities of daily life.
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12 ---- Figure 1 ----
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14 Of the 169 couples who had provided data at all study assessments, between 0.60% and
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16 3% of couples chose not to relay socio-demographic information at baseline. Patients' mean
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18 age was 63.59 years, $SD = 6.68$, range 47 to 77, and partners' mean age was 60.12 years, SD
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20 $= 7.89$, range 39 to 75 years. Most couples were married (88%), the remainder were in a long-
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22 standing relationship with a shared home. Mean relationship duration as reported by patients
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24 was 32.35 years, $SD = 13.96$ years. Most patients (88.60%) and partners (85.20%) reported to
25
26 have children. Regarding school education, 52.10% of patients and 41.30% of partners
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28 reported more than ten years of schooling, the remainder reported nine or ten years of
29
30 schooling, one partner reported less than nine years of schooling. About half of the patients
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32 (56.60%) and partners (48.80%) were retired. Patients' tumors varied in size (as denoted by
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34 "T" = tumor size; "T" = 1: 0.60 %; "T" = 2: 67.30%; "T" = 3: 32.10 %), tumors of 17 patients
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36 had spread to lymph nodes (as denoted by "N" = nodes; "N" = 1: 10.06 %), and the tumor of
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38 one patient had spread further (as denoted by "M" = metastases; "M" = 1: 0.6 %).
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43 Questionnaires were used at five measurement points during an approximate eight-
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45 month period around surgery. The first measurement (T0) took place upon admission, one day
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47 prior to surgery. Study research assistants approached patients and their partners at the
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49 departments of urology, presented information on the study, explained study materials, and
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51 asked for written consent to participate in the study. Baseline questionnaires were left with
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53 participants and picked up again on the same day. If partners were not present upon
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55 admission, they received information, consent forms, and study materials via mail with
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57 separate pre-stamped return envelopes for questionnaires and consent forms. The remaining
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longer-term post-surgery measurements were scheduled at one month (T1), three months (T2), five months (T3), and seven months (T4) following the removal of the indwelling catheter that is, following the onset of incontinence. This duration was chosen as it represents the time frame with the steepest slope of recovery from post-surgery incontinence (e.g., Resnick et al., 2013). Participants were mailed study materials and separate pre-stamped return envelopes for patients and partners. In the present study, mainly data following the onset of incontinence were included (T1 to T4), as research aims pertained to assessments during rehabilitation after surgery. The study procedure was approved by an Institutional Review Board.

Measures

Patients' and partners' affect was measured by the German version of the Positive and Negative Affect Schedule (PANAS; Krohne, Egloff, Kohlmann, & Tausch, 1996). The positive and negative affect scales consist of ten adjectives that were rated on four-point scales with anchors *do not agree at all* (0) to *agree completely* (3). Internal consistencies ranged between $\alpha = .80$ and $.92$.

Patients' LoDs were assessed with four single-items, one per incontinence-related independence goal (XXX, in press). The stem "*During the past week...*," was followed by the items, LoD1: protect self-reliance ("*...it was my goal to independently accomplish activities of daily life (e.g., work, household, shopping, social activities, hobbies) without using pads or other technical aids*"), LoD2: rely on technical aids ("*...it was my goal to independently accomplish activities of daily life by using pads or other technical aids*"), LoD3: rely on technical aids and help ("*...it was my goal to accomplish activities of daily life by using pads or other technical aids and support by others [e.g., my partner, close others]*"), and LoD4: minimize discomfort by disengagement ("*...it was my goal to even also refrain from pursuing pleasurable activities rather than worry about unpleasant consequences of incontinence all the time*"). LoDs were endorsed on seven-point scales, with the anchors *do not agree at all* (1)

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3 and *agree completely* (7). Due to U-shaped distributions of item responses, we dichotomized
4 responses at response option 4, the middle category (1-4 were coded 0, and 5-7 were coded 1).
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7 LoDs were not independent of one another, but inter-related. Mean correlations across all
8 measurements ranged in absolute values from $|.23|$ to $|.60|$, the latter being the relation
9 between LoD2 and LoD3.
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14 Patients' received and partners' provided spousal support were assessed by two
15 subscales of the Berlin Social Support Scales (BSSS; Schulz & Schwarzer, 2003), that is,
16 patient-reported received support (11 items) and partner-reported provided support (11 items).
17
18 Both versions assess emotional (soothing, comforting) and instrumental (help in everyday
19 chores) support, were adapted to gender, and framed in parallel ways. Due to high inter-
20 correlations between emotional and instrumental support components of the respective scales
21 (received emotional support < > received instrumental support mean $r = .62$; partner provided
22 emotional support < > partner provided instrumental support mean $r = .69$), both support
23 functions were collapsed in an overall score. Receipt and provision of support during the past
24 week were reported on four-point Likert-type scales, ranging from *do not agree at all* (1) to
25 *agree completely* (4). Internal consistencies ranged from $\alpha = .78$ to $.89$.
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38 Patients' urinary incontinence was measured by the German short form of the
39 International Consultation of Incontinence Questionnaire (ICIQ-SF; Karantanis, Fynes,
40 Moore, & Stanton, 2004). The ICIQ-SF weighted sum score, built of items assessing
41 frequency of incontinence, amount of urine leaked, and burden by incontinence, ranges from
42 0 to 21 with higher values pointing to higher severity of incontinence and internal
43 consistencies ranging from $\alpha = .75$ to $.81$.
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51 Patient and partner comorbidity was assessed at T0 (prior to surgery) using a list of 34
52 chronic diseases (modelled after Charlson, Szatrowski, Peterson, & Gold, 1994). Participants
53 were asked to indicate whether or not they suffered from these illnesses and to note additional
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ones if necessary. A sum score representing total number of illnesses was created. Patients had a mean of 2.78, $SD = 2.57$, and partners a mean of 2.72, $SD = 2.50$, diseases.

Analyses

Only couples who had provided data at all 5 measurement points (T0 to T4) were included in the analyses ($n = 169$). Of these, depending on the role of the actor (i.e., patient or partner) and outcome, between 3 and 5 respondents were excluded from analyses by the statistics package due to more than 25% missing data for the respective model. To account for the factors uniquely associated with dropout, we included these as covariates in the central analyses (i.e., partner-reported vocational training and patient-reported difficulty with performing activities of daily living; see above). This strategy was chosen to minimize bias due to drop out. Only unique correlates of dropout were accounted for to reduce the number of covariates in our central analyses.

Analyses testing Hypotheses 1 and 2 used two-level hierarchical linear models, with repeated assessments (level-1) nested in individuals (level-2). Outcomes were patients' (Hypothesis 1) or partners' (Hypothesis 2) affect indicators, assessed post-surgery, with separate models fitted for positive and negative affect. Level-1 lagged (T-1) time-varying predictors included: the respective affect measure, patient-reported incontinence, a linear TIME trend that was coded in months and centred on the first measurement point following surgery (TIME at T1 = 0), the respective support indicator, all four patient-reported LoDs and all four support x LoD interactions. As endorsements of LoDs were not independent of each other, all support x LoD interactions were tested competitively. Additionally, the following covariates were included: patients' or partners' comorbidity, patients' or partners' age (all level-2), and correlates of dropout. Except for the linear TIME trend, all other predictors were centred around their grand means. A first-order heterogeneous autoregressive error covariance structure was imposed and a maximum likelihood estimation procedure was used. Because there were set roles for patients and partners, models either used patient variables only (except

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3 for partners' correlates of dropout; tests of Hypothesis 1) or partner variables were
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5 complemented with patient variables (tests of Hypothesis 2).
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8 Descriptive analyses for continuous variables used two-level hierarchical linear models,
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10 for dichotomous outcomes generalized estimating equations were employed. Again time
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12 points (level 1) were nested in individuals (level 2). On level-1, a linear TIME trend was
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14 introduced. Moreover, the two identified unique correlates of dropout were accounted for as
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16 covariates. In all descriptive analyses models, a first-order autoregressive error covariance
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18 structure was imposed and a maximum likelihood procedure was used.
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21 For all two-level hierarchical linear models, all random effects were tested, but retained
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23 only when models converged. All analyses were done using SPSS 20.
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25 **Results**

26 **Descriptive Results**

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28 Patients' incontinence decreased from one month to seven months following the onset
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30 of incontinence. The same was true for patients' received support and partners' provided
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32 support over time. Patients' positive affect increased over time. Neither patients' negative
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34 affect nor partners' affect changed (see Table 1). Evidence for significant variability of
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36 intercepts between individuals emerged in all models.
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40 --- Table 1 ---
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43 Patients' endorsement of the most ambitious LoD1 (protect self-reliance) increased
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45 whereas endorsements of LoD2 (rely on technical aids) and LoD3 (rely on technical aids and
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47 help) decreased as incontinence receded in the months following surgery. When introducing
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49 patient-reported severity of incontinence to the model, the linear TIME trend was no longer
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51 significant when LoD4 (minimize discomfort by disengagement) was the outcome.
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53 Additionally, patients reporting higher incontinence were less likely to endorse LoD1 (protect
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55 self-reliance), whereas they were more likely to endorse LoD2 (rely on technical aids)
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57 through LoD4 (minimize discomfort by disengagement; see Table 2).
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---- Table 2 ----

LoDs as Moderators of the Support -- Affective Well-Being Relationship

Hypothesis 1 predicted that a better match between patients' LoDs and receiving support from their partners should be associated with better affective well-being. Interaction terms between endorsements of LoDs and levels of patient-reported received support from partners were used as indicators of degree of this match. Interactions that were hypothesized to represent a worse LoD -- support match involved LoD1 (protect self-reliance) and LoD2 (rely on technical aids), those representing a better match between patients' independence goals and support receipt involved LoD3 (rely on aids and help) and LoD4 (minimize discomfort by disengagement). As can be seen in Table 3, results partly supported the hypothesis.

With regard to patients' negative affect, an LoD1 (protect self-reliance) x received support interaction yielded partial support for Hypothesis 1. Simple slope analyses indicated that patients who had disengaged from LoD1 responded more negatively to a lack of support from partners than those who received strong support (simple slope = -0.07, $z = -3.65$, $p < .001$). However, not in line with Hypothesis 1, patients who endorsed LoD1 did not report higher negative affect when they had received much support from their partners (simple slope = 0.01, $z = 0.45$, $p = .656$), but were unaffected by this support (Figure 2, Panel A).

Also in line with Hypothesis 1, simple-slope analyses of an LoD4 (minimize discomfort by disengagement) x support interaction revealed that patients who had endorsed LoD4, seemed to benefit from receiving support in terms of decreased negative affect (simple slope = -0.23, $z = -4.39$, $p < .001$). However, patients who did not endorse LoD4 did not (simple slope = -0.01, $z = -0.42$, $p = .676$; Figure 2, Panel B).

---- Table 3 ----

Using patients' positive affect as an outcome, an interaction of LoD2 (rely on technical aids) x received support emerged (see Table 3). Partially in line with predictions, simple-slope

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3 analyses showed that patients who had not endorsed LoD2 also reported higher positive affect
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5 when they had received much support (simple slope = 0.17, $z = 2.59$, $p = .009$). On the other
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7 hand, patients who endorsed LoD2 did not benefit from higher levels of received support in
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9 terms of later positive affect (simple slope $< .01$, $z = 0.01$, $p = .991$; see Figure 2, Panel C).

11 Also predicting patients' positive affect, another LoD4 (minimize discomfort by
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13 disengagement) x support interaction trend ($p = .080$) was found. Matching predictions,
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15 simple slopes indicated that support receipt was associated with higher positive affect only if
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17 patients had endorsed LoD4 (simple slope = 0.18, $z = 2.21$, $p = .027$). For patients who had
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19 not endorsed LoD4, no relation between received support and positive affect emerged (simple
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21 slope = 0.03, $z = 0.80$, $p = .426$).

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25 ----- Figure 2 -----

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27 Hypothesis 2 predicted benefits for partners' affect from a better match of patients'
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29 endorsement of LoDs and support provided by partners. Using partners' negative affect as an
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31 outcome, results partially supported these assumptions (see Table 4). An LoD1 (protect self-
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33 reliance) x partner provided support interaction emerged (at $p = .050$). Simple slope analyses
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35 indicated that when partners had provided support while patients pursued the goal to protect
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37 self-reliance (LoD1), partners' negative affect tended to be higher (simple slope = 0.07, $z =$
38
39 1.88, $p = .061$; see Figure 3). This was not the case when patients had not endorsed LoD1
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41 (simple slope = -0.02, $z = -0.87$, $p = .383$). None of the other LoD x partner-provided support
42
43 interactions explained variance in partners' negative affect.
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46
47 ----- Table 4 -----

48
49 Using partner-reported positive affect as an outcome, only the LoD4 (minimize
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51 discomfort by disengagement) x partner provided support interaction approached significance
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53 (at $p = .061$; see Table 4). Simple slopes indicated that partners of patients who had endorsed
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55 LoD4 tended to report higher positive affect if they had provided much as opposed to little
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support to patients (simple slope = 0.16, $z = 1.66$, $p = .098$), whereas partners of patients who had not endorsed this goal did not (simple slope = -0.04, $z = 1.10$, $p = .272$).

---- Figure 3 ----

Discussion

The process of adapting to urinary incontinence following radical prostatectomy requires adjustments of health-related independence goals from patients (cf. XXX, in press), but also coordination in supportive interaction between patients and their partners.

The present results partially indicated benefits of a better match between patients' endorsement of LoDs and partners' support in terms of both partners' affective well-being. Hypothesis 1 predicted that for patients, a match between more received support and endorsements of LoD3 (rely on technical aids and help) or LoD4 (minimize discomfort by disengagement) would be associated with better affective well-being, whereas higher levels of support combined with patients' endorsements of the more advanced LoD1 (protect self-reliance) or LoD2 (rely on technical aids) would not. Indeed, for patients who endorsed LoD4 (minimize discomfort by disengagement), more support was related with lower negative affect and tentatively with higher positive affect, whereas for patients who did not endorse this goal, no such relations emerged. However, an analogous interaction involving LoD3 (rely on technical aids and help) was not found, neither for negative nor for positive affect. This was especially unexpected as LoD3 explicitly entailed not only the use of technical aids, but also recruitment of external help to keep up activities of daily living. Intending to use support to manage life with incontinence and being provided with such support by one's partner seems well-matched, but might still trigger embarrassment or pose problems for self-esteem in the support recipient that counteract potential positive effects (Bolger, Zuckerman, & Kessler, 2000; Resendes & McCorkle, 2006).

Indications for reduced efficacy of received support when it mismatched recipients' LoDs (1 and 2; cf. Martire et al., 2011; Nagurney et al., 2004) also emerged. Fortunately, but

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2
3 contrary to Hypothesis 2, this mismatch did not seem to be harmful to patients' affective well-
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5 being. Instead, only patients who *had not* endorsed LoD1 (protect self-reliance) or LoD2 (rely
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7 on technical aids) seemed to benefit from received support in terms of their negative (LoD1 x
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9 received support) or positive (LoD2 x received support) affective well-being. Patients who
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11 *had* endorsed these more ambitious goals seemed unaffected by support receipt. An
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13 explanation for this might be found in the dominant affect components assessed with the
14
15 PANAS. Even though support received was not in line with patients' more ambitious
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17 independence goals (LoD1 or LoD2), it is unlikely that this should have hurt recipients' self-
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19 esteem and thereby produced anxious or depressed affect (Bolger et al., 2000; Fisher, Nadler,
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21 & Whitcher-Alagna, 1982). More likely, it created a nuisance at the time that might have
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23 provoked an anger reaction. An important limitation is that anger is somewhat under-
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25 represented in the PANAS version used in this study.
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30 Looking at the other side of the support dyad, that is, partners' affect correlates of their
31
32 own support provision as a function of patients' independence goals (Hypothesis 2), some
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34 evidence for the inefficiency of mismatched support emerged, albeit only as trends. When
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36 patients had set the goal to protect their self-reliance (i.e., endorsed LoD1) and partners had
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38 provided much support, partners' negative affect tended to increase. Qualitative findings in
39
40 the context of patients' convalescence from prostatectomy suggest that partners are often
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42 uncertain and anxious about the appropriateness and quantity of their support provision as
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44 they witness patients' struggle for self-reliance (Gray et al., 2000). Moreover, unwanted
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46 support is less likely to be encoded as such by the intended recipient who then fails to
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48 reciprocate, which might also contribute to disappointment or perceived unfairness in support
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50 providing partners (Kuijer et al., 2001). On the other hand, partners' higher support provision
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52 in the context of patients' lowered lines of defense (i.e. when patients had endorsed LoD4:
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54 minimize discomfort by disengagement), tended to be associated with increases of partners'
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56 positive affect and thus seemed to be a more gratifying experience. Note, that a
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3 complementary set of findings was observed in patients who had reported to have received
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5 much support from their partners and had endorsed LoD4 (minimize discomfort by
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7 disengagement). Support provided in this context might have created new rewarding
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9 interactions for patients and their partners which compensated for patients' goals to disengage
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11 from pleasurable activities to minimize discomfort by incontinence. However, effects
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13 involving partners' data did not reach conventional levels of significance and were restricted
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15 to interactions with patients' "most extreme" lines of defense only. In light of this and the
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17 remaining non-findings in the models predicting partner affect, it is likely that patient-
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19 reported goals were too distal as moderators to produce larger effects.
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22 **Limitations and Outlook**

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25 This study had several limitations. Contrary to findings from an earlier pilot study, the
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27 present operationalization of LoDs revealed problems with the continuous response format
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29 that had to be mended by dichotomizing responses. Moreover, due to the relatively brief
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31 assessment period, patients' endorsement of LoDs related to longer-term developments of
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33 urinary incontinence could not be investigated. Also, this study would have benefited from
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35 partner-reports of patients' LoDs to arrive at more proximal predictors of partners' own
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37 emotional adaptation to support provision to patients. In addition to urinary incontinence,
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39 erectile dysfunctions are also a common sequel of radical prostatectomy. Future work should
40
41 consider autonomy limitations due to these sexual dysfunctions. To accomplish this, larger
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43 time-frames should be considered, as recovery from sexual dysfunctions is less frequent and
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45 usually takes longer (Resnick et al., 2013). Finally, future work should study the LoD model
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47 within different patient populations who have to come to terms with varying prognoses and
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49 speed of decline or recovery.
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52 **Conclusions**

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55 Findings of this study indicate that a better fit between patients' lines of defense and
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57 partner support has beneficial effects for patients' and partners' affective well-being.
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Table 1

Descriptive Statistics for Affect, Support, and Incontinence Severity at 1 Month, 3, 5, and 7 Months Following Onset of Incontinence

Scale (item range)	Mean				Fixed Effect Estimate		Random Effect Estimates		
	1 Month	3 Months	5 Months	7 Months	Intercept	TIME	Intercept	Level-1 Residual	Auto-correlation
Patient PA (0-3)	1.46 (0.62)	1.44 (0.61)	1.54 (0.61)	1.61 (0.63)	1.47*** (0.05)	0.02** (0.01)	.23*** (.03)	.12*** (.01)	.19* (.08)
Patient NA (0-3)	0.23 (0.33)	0.23 (0.36)	0.18 (0.30)	0.20 (0.35)	0.20*** (0.02)	0.01 (0.01)	.05*** (.01)	.05*** (.01)	-.05 (.06)
Partner PA (0-3)	1.41 (0.59)	1.44 (0.60)	1.45 (0.65)	1.45 (0.62)	1.43*** (0.04)	0.01 (0.01)	.21*** (.03)	.16*** (.01)	.18* (.08)
Partner NA (0-3)	0.28 (0.32)	0.25 (0.31)	0.25 (0.33)	0.29 (0.34)	0.25*** (0.02)	0.01 (0.01)	.04*** (.01)	.06*** (.01)	.05 (.07)
Patient Rec Sup (1-4)	3.22 (0.58)	3.13 (0.60)	3.03 (0.63)	2.98 (0.64)	3.19*** (0.05)	-0.03*** (0.01)	.26*** (.03)	.09*** (.01)	-.11† (.07)

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23

Partner Prov Sup (1-4)	3.27 (0.58)	3.21 (0.56)	3.07 (0.62)	3.05 (0.63)	3.27*** (0.05)	-0.04*** (0.01)	.22*** (.03)	.12*** (.01)	.23*** (.08)
Patient severity of incontinence (0-21)	10.88 (5.63)	8.39 (5.69)	6.92 (5.57)	6.44 (5.58)	9.90*** (0.40)	-0.56*** (0.06)	15.31*** (2.50)	10.07*** (1.45)	.46*** (.08)

Note. $164 \leq n \leq 169$. † $p < .10$, ** $p < .01$, *** $p < .001$. PA: positive affect; NA: negative affect; Rec Sup: received support; Prov Sup: provided support. Summary statistics for change in central variables come from 2-level models with time points nested in individuals. Covariates not depicted: partner-reported vocational training and patient-reported difficulty with performing activities of daily life (correlates of dropout). *SD*: standard deviation; *SE*: standard error.

Table 2

Endorsement of Lines of Defense at 1 Month, 3, 5, and 7 Months Following Onset of Incontinence

Lines of Defense (Range: 0/1)	% Endorse				Estimate (SE)		
	1 Month	3 Months	5 Months	7 Months	Intercept	TIME	Incontinence Severity
LoD1: Protect Self-Reliance	24.00	37.70	49.70	54.60	-0.92*** (0.18)	0.12** (0.04)	-0.22*** (0.03)
LoD2: Rely on Technical Aids	81.00	70.50	59.40	48.50	1.53*** (0.21)	-0.16*** (0.04)	0.29*** (0.04)
LoD3: Rely on Technical Aids and Help	65.90	53.00	44.80	41.50	-1.06*** (0.26)	-0.07† (0.04)	0.17*** (0.03)
LoD4: Minimize Discomfort by Disengagement	20.40	13.90	8.60	7.90	-4.23*** (0.46)	-0.08 (0.06)	0.23*** (0.03)

Note. $164 \leq n \leq 169$. † $p < .10$, * $p < .05$, ** $p < .01$, *** $p < .001$. SE: standard error. LoD: Line of Defense. Summary statistics for change in LoD endorsement come from 2-level Generalized Estimating Equations with time points nested in individuals. Covariates not depicted: partner-reported vocational training and patient-reported difficulty with performing activities of daily life (correlates of dropout). LoD: Line of Defense.

Table 3

Central Models Predicting Patients' Negative and Positive Affect

	Patient Negative Affect			Patient Positive Affect		
	Est	SE	<i>p</i>	Est	SE	<i>p</i>
Intercept	0.19	0.02	<.001	1.50	0.03	<.001
Partner Vocational Training	0.07	0.05	.166	-0.02	0.07	.758
Patient Age	-0.01	0.01	.180	0.01	0.01	.326
Patient Comorbidities	0.01	0.01	.562	0.01	0.01	.791
TIME	0.01	0.01	.361	0.02	0.01	.107
Patient Affect T-1	0.67	0.04	<.001	0.81	0.03	<.001
Patient Difficulty w/Activities	0.07	0.02	.001	-0.06	0.03	.064
Patient Incontinence	-0.01	0.01	.224	-0.01	0.01	.864
Patient LoD1	-0.02	0.03	.345	0.06	0.04	.144
Patient LoD2	0.02	0.03	.543	-0.01	0.05	.868
Patient LoD3	0.01	0.03	.912	-0.01	0.05	.830
Patient LoD4	0.05	0.03	.199	0.07	0.06	.199
Patient Rec Sup	-0.05	0.02	.016	0.05	0.03	.087
Patient LoD1 * Rec Sup	0.08	0.04	.046	-0.04	0.07	.555
Patient LoD2 * Rec Sup	0.06	0.05	.257	-0.17	0.08	.038
Patient LoD3 * Rec Sup	0.07	0.05	.133	0.01	0.08	.929
Patient LoD4 * Rec Sup	-0.22	0.06	<.001	0.16	0.09	.080

Note. $N = 164$. Table displays fixed effect estimates. Random effects estimates for model

predicting negative affect: intercept variance = 0.01 (0.01), *n.s.*; variance T2 = 0.09 (0.1), *p*

<.001; variance T3 = 0.06 (0.01), *p* < .001; variance T4 = 0.08 (0.1), *p* < .001; autocorrelation = -

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3 .57 (.06), $p < .001$. Random effects estimates for model predicting positive affect: variance T2 =
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5 0.17 (0.02), $p < .001$; variance T3 = 0.16 (0.02), $p < .001$; variance T4 = 0.18 (0.2), $p < .001$;
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7 autocorrelation = -.37 (.06), $p < .001$. Coefficients $< .01$ rounded to .01. Rec Sup: Received
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9 Support. LoD: Line of Defense. LoD1 (protect self-reliance), LoD2 (rely on technical aids),
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11 LoD3 (rely on technical aids and help), LoD4 (minimize discomfort by disengagement). Est:
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13 estimate. *SE*: standard error.
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For Review Only

Table 4

Central Models Predicting Partners' Negative and Positive Affect

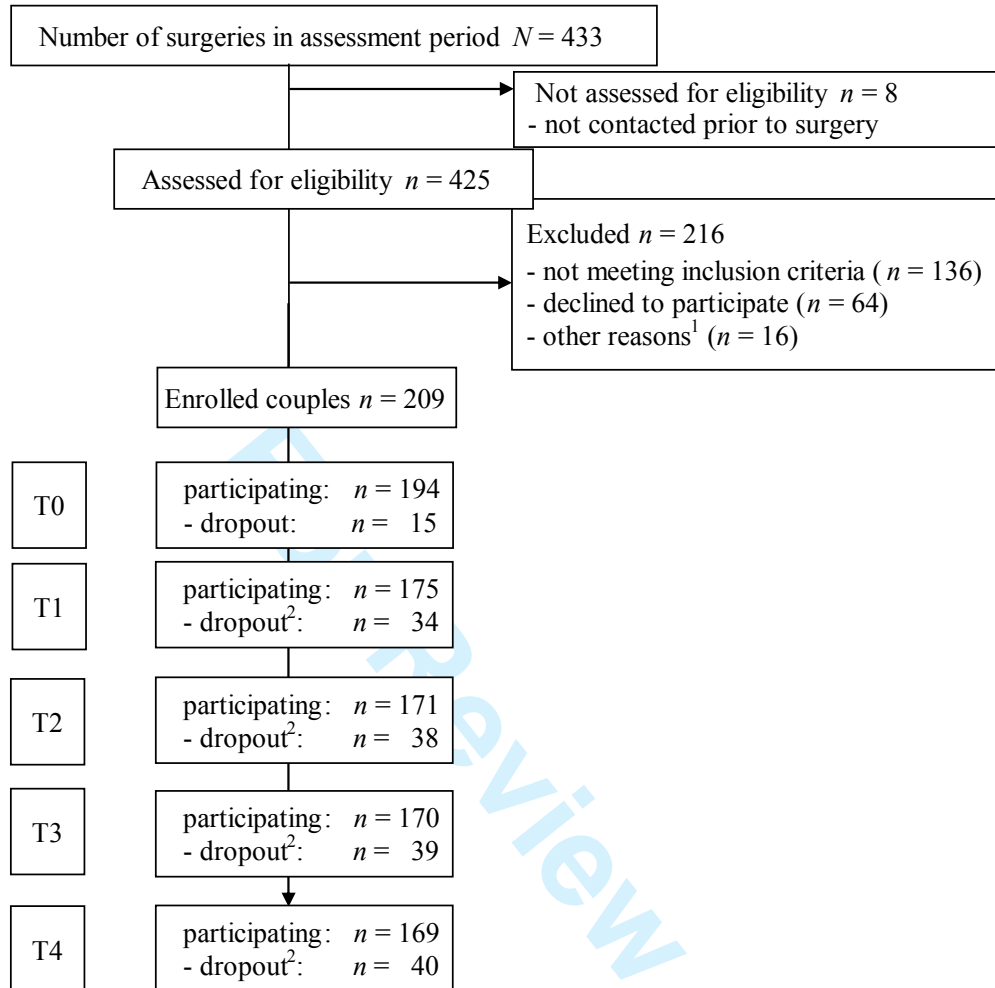
	Partner Negative Affect			Partner Positive Affect		
	Est	SE	<i>p</i>	Est	SE	<i>p</i>
Intercept	0.23	0.02	<.001	1.49	0.03	<.001
Partner Vocational Training	0.05	0.06	.882	-0.06	0.08	.482
Partner Age	-0.01	0.01	.916	0.01	0.02	.937
Partner Comorbidities	0.01	0.01	.013	-0.02	0.01	.003
TIME	0.02	0.01	.041	-0.02	0.01	.213
Partner Affect T-1	0.55	0.04	<.001	0.76	0.03	<.001
Patient Difficulty w/Activities	0.02	0.03	.814	0.02	0.04	.498
Patient Incontinence	-0.01	0.01	.184	0.01	0.01	.652
Patient LoD1	0.02	0.03	.487	0.05	0.05	.371
Patient LoD2	0.02	0.04	.512	0.02	0.06	.793
Patient LoD3	-0.01	0.03	.917	-0.03	0.05	.610
Patient LoD4	0.03	0.04	.464	-0.09	0.06	.132
Partner Prov Sup	0.01	0.02	.580	-0.01	0.03	.762
Patient LoD1 * Partner Prov Sup	0.11	0.05	.050	0.01	0.08	.901
Patient LoD2 * Partner Prov Sup	-0.01	0.06	.864	0.01	0.10	.898
Patient LoD3 * Partner Prov Sup	0.01	0.06	.919	-0.09	0.09	.292
Patient LoD4 * Partner Prov Sup	0.03	0.07	.672	0.20	0.11	.061

Note. $N = 166$. Table displays fixed effect estimates. Random effects estimates for model

predicting partners' negative affect: variance T2 = 0.08 (0.1), $p < .001$; variance T3 = 0.08 (0.01), $p < .001$; variance T4 = 0.10 (0.1), $p < .001$; autocorrelation = -.18 (.09), $p < .05$. Random effects

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3 estimates for model predicting partners' positive affect: variance T2 = 0.18 (0.02), $p < .001$;
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5 variance T3 = 0.22 (0.03), $p < .001$; variance T4 = 0.24 (0.3), $p < .001$; autocorrelation = -.33
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8 (.06), $p < .001$. Coefficients $< .01$ rounded to .01. Prov Sup: Provided Support. LoD: Line of
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10 Defense. LoD1 (protect self-reliance), LoD2 (rely on technical aids), LoD3 (rely on technical
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12 aids and help), LoD4 (minimize discomfort by disengagement). Est: estimate. *SE*: standard error.
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For Review Only



Note. ¹No reason stated ($n = 8$), temporarily abroad ($n = 6$), time/health-related issues ($n = 2$); ²cumulative dropout

Figure 1. Participant flow (T = Time).

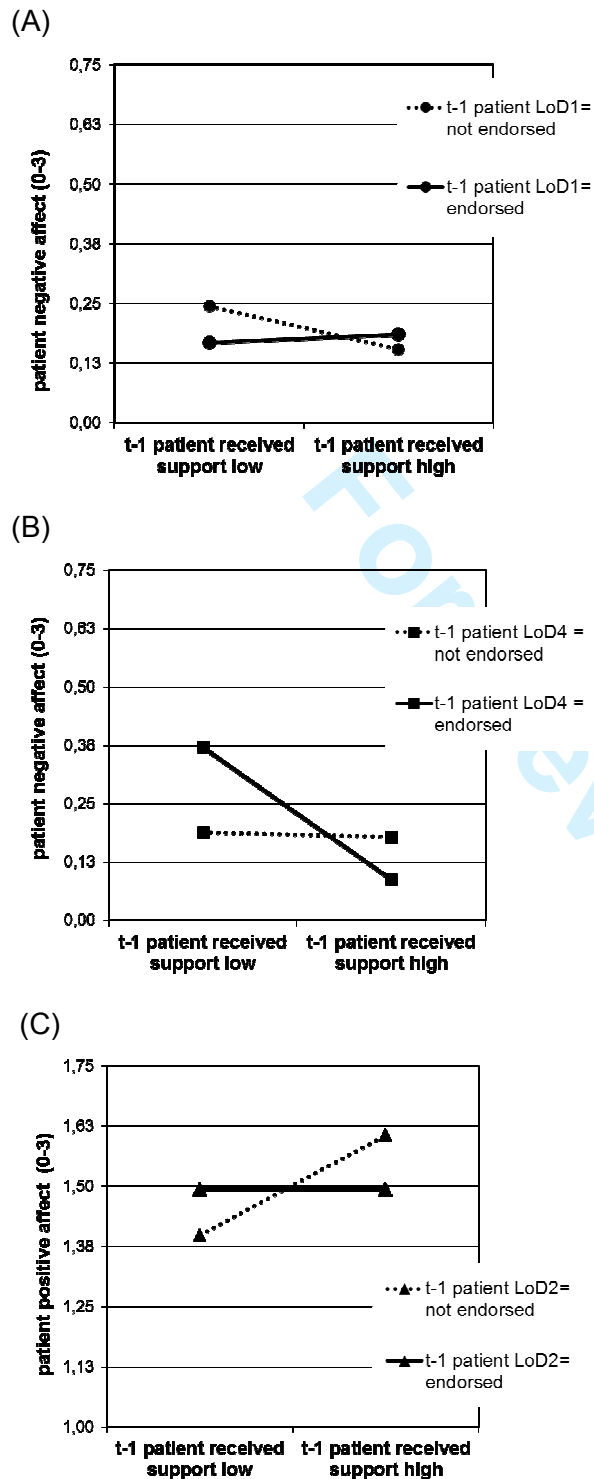


Figure 2. Plotted interaction of patients' LoDs [LoD1 (protect self-reliance): Panel A; LoD4 (minimize discomfort by disengagement): Panel B; LoD2 (rely on technical aids): Panel C] with received support (\pm 1 SD) predicting negative (Panels A and B) and positive affect (Panel C).

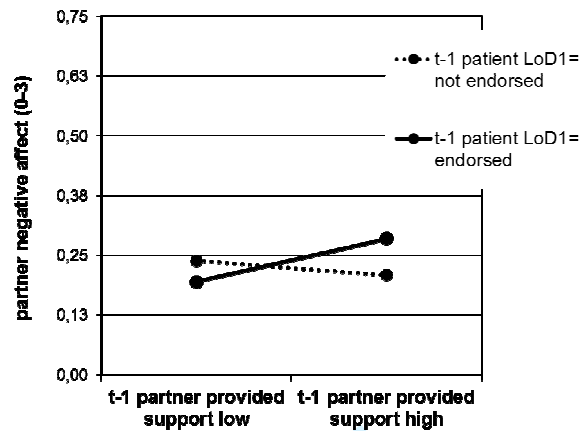


Figure 3. Plotted interaction between patients' LoD1 (protect self-reliance) and partners' provision of support to patients ($\pm 1 SD$) predicting partners' negative affect.